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A Structural Equation Model of Alcohol Use Patterns Among Young Adults in the U.S. military: Complexities Among Stress, Drinking Motives, Impulsivity, Coping, Alcohol Use and Job Performance

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A Structural Equation Model of Alcohol Use Patterns Among Young Adults in the U.S. military: Complexities Among Stress, Drinking Motives, Impulsivity, Coping, Alcohol Use and Job Performance

By

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To my parents Jin-Hun Sohn and Sook-Hee Kim for their unwavering love, support, and belief in me throughout the years.

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A Structural Equation Model of Alcohol Use Patterns Among Young Adults in the U.S. Military: Complexities Among Stress, Drinking Motives, Impulsivity, Coping, Alcohol Use, and Job Performance

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The primary aim of this study was to provide a model that depicts the alcohol use patterns of young males in the U.S. military. Using Structural Equation Modeling (SEM) based on a secondary data analysis of the 2005 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel, the researcher developed and tested a multivariate model of alcohol use patterns that incorporates psychological factors (i.e., work stress, family stress, and drinking motives) and developmental factors (i.e., impulsivity) associated with drinking and job performance among young adults. Multiple fit indices were used to assess the model fit. Bootstrapping and multiple group analysis were used to determine mediating effects of drinking motives and moderating effects of coping on stress and impulsivity induced alcohol use. The sample included 1,715 young (aged 18-25) male military personnel.

The proposed model shows a good fit with the 2005 DoD data set. Controlling for service region, race/ethnicity, marital status, pay grade, and education level, the multivariate analyses provide limited support for a direct (positive) relationship between

stress and alcohol use. The study does provide evidence for a fully mediated model of stress and alcohol use via drinking motives (e.g., drinking to forget about problems or to cheer oneself up from bad mood). Drinking motives also significantly mediated the relationship between impulsivity and alcohol use. These findings support the life stress paradigm and clarify the nature of the relationship between stress and alcohol use by verifying that cognitive processes have a substantial effect on drinking patterns. A multiple group analysis, however, showed that positive coping behaviors (e.g. talking to a friend or family member, saying a prayer, exercising or play sports, engaging in a hobby, getting something to eat, and thinking of a plan to solve a problem) do not significantly affect the relationship between stress and alcohol use.

Implications for future research and practice include the importance of focusing on the mediating role of drinking motives as it may provide a critical intervention component for targeting stress-induced alcohol use. The findings also suggest the need to understand how young males' impulsivity is linked to alcohol use and job performance directly and indirectly through drinking motives.

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CHAPTER I

INTRODUCTION

ALCOHOL USE TRENDS AMONG YOUNG ADULTS IN THE U.S. MILITARY

Understanding why people drink alcohol is extremely important for the health and safety of individuals who drink as well as their families, significant others, and the public. Understanding young adults' alcohol use is especially important because unhealthy drinking behaviors during young adulthood are likely to persist in later in life and are linked to alcohol-related problems in the long run (Bennette, McCrady, Johnson, & Pandina, 1999). According to the National Survey on Drug Use and Health (NSDUH), approximately 51 percent of those aged 18 to 20 and 67 percent of those aged 21 to 25 used alcohol in 2005. Besides, both binge drinking (i.e., consuming five or more drinks in a row at least once in the past month) and heavy drinking (i.e., consuming five or more drinks in a row on at least five occasions in the past month) rates are reported highest among young adults aged 18 to 25 in the general population, peaking at age 21 (Substance Abuse and Mental Health Services Administration, 2006).

Drinking is even more prevalent among young military personnel than among many other young populations. Numerous descriptive reports conclude that the young military population is at high risk for heavy alcohol use and its related consequences. In 2002, approximately 33 percent of young male military personnel reported heavy drinking (i.e., consuming 5 or more drinks in a row on at least five occasions in the past month) compared to 18 percent of their civilian peers, and about 54 percent of all young military personnel engaged in binge drinking (i.e., consuming five or more drinks in a row at least once in the past month) compared to 41 percent of the young civilian

population (Bray et al., 2003). Furthermore, heavy alcohol use among military personnel from 19 to 25 percent between 2002 and 2005 (a 30% increase), while heavy alcohol use among young civilians decreased from 18 to 17 percent of within the same time period (Bray et al., 2006). These group differences, i.e., military personnel showing significantly higher alcohol consumption than civilians, are a consistent phenomenon (Ames & Curandi, 2005). It is important to note that drinking prevalence rates for military personnel may substantially underestimate the true figures. Though civilians may also underreport behaviors such as drinking, survey participants in the military may be even more motivated to do so for fear of negative consequences to their service status (Bray et al., 2003) even when they are assumed of the confidentiality of their responses. There are also gender disparities in alcohol consumption as well as reasons for drinking. For example, male military personnel are not only twice as likely as male civilians to be heavy drinkers (Bray et al., 1991), but they are four times more likely to be heavy drinkers than female military personnel (Bray et al., 2003).

Some literature suggests that many young people who drink problematically "mature out" of the problem when they pass through young adulthood (Gotham, Sher, & Wood, 2003; O'Malley, 2005) or take on adult roles (O'Malley, Bachman, & Johnston, 1984; Temple & Fillmore, 1986; O'Malley, 2005). Nonetheless, young adults are at higher risk for unhealthy drinking and experience more negative consequences due to drinking compared to any other population age group. Examples of the many negative outcomes of drinking among young adults include unclear thinking, drinking and driving, impairment in school or work performance, unintended pregnancies, physical problems, including sexually transmitted diseases (STD), psychological problems, and interpersonal

problems (Center for Disease Control, 2005). The negative consequences associated with drinking among military personnel are similar to their civilian peers, such as health risks due to alcohol use, interpersonal issues at home or work, or loss of productivity. In addition, both military personnel and civilians who use alcohol heavily are more likely to have family trouble, exhibit symptoms of anxiety and depression, and report more limitations in activities due to poor mental health than lower-level alcohol consumers (Bray et al., 2003). Heavy alcohol use among military personnel, however, may have particularly serious ramifications because it can significantly impact the military's productivity, particularly combat readiness, in addition to military personnel's personal well-being (Bray, Marsden, & Peterson, 1999).

There has been a steady increase of young adults who enter the military at age 18, and about three-quarters of new U.S. active duty military recruits are composed of young adults (Substance Abuse and Mental Health Services Administration, 2004). Young people join the U.S. military for numerous reasons: to learn skills; have a military career; earn money for college; and acquire health and vacation benefits. Other intangible reasons include opportunities to gain leadership experience, pride and/or honor, and the perception that military is a good place to work (U.S. Government Accountability Office, 2005). Despite a plethora of literature on young adults' and college students' drinking, literature on military drinking, especially research on the drinking patterns of young military personnel, who make up more than two-thirds of the military population, is very limited. There has been some research on why young people, especially college students, drink. These findings can be used to draw inferences about drinking among the young military population that is at a similar developmental stage. For example, suggestions are

that full-time college students drink more than non-college or part-time students due to the differences in college living conditions that promote drinking (Presley, Meilman, & Leichliter, 2002). College students who live in dorms tend to consume much more alcohol than those who commute from their family's home (Presley et al., 2002). In addition, college peers and college drinking norms affect how college students perceive drinking. In a review of studies on peer influences on college drinking, Bosari and Carey (2001) concluded that students tend to perceive campus attitudes towards drinking as more permissive than they actually are. Moreover, college students are also likely to overestimate their peers' drinking behaviors (Bosari & Carey, 2001). Other risk factors important in youths' development include changes in family status that lead to new freedoms, including fewer parental constraints, which may permit them to engage in increased drinking. In a similar sense, marital status and parenthood are also constraints suggested to be strongly associated with changes in alcohol consumption for both men and women (Bachman et al., 1997). Therefore, full-time college students who are single and not constrained by a spouse or children and can be at even higher risk for drinking than any other young population (Bachman et al., 1997; Wood, Read, Palfai, & Stevenson 2001; Baer, 2002; O'Malley, 2005).

Similar to life and environmental changes college students experience, the transition from civilian to military life involves major changes in young military personnel's living circumstances as well as exposure to particular perceptions and norms about drinking, which may affect their own drinking behaviors (Ames & Cunradi, 2004). When young people join the military, they generally become physically separated from their family members. They may also experience frequent deployments, either within the

United States or overseas, and like college students, these changes cause young military personnel to become more independent from family and experience less direct parental or other family supervision. As any other young adults, those in the military are in a distinct developmental stage characterized by risk-taking, the need for belonging, and being easily influenced by their peers and new environments or communities they enter (Ames & Cunradi, 2004).

Young military personnel's drinking is also influenced by the availability of alcohol and the drinking norms portrayed in the military system as well as countries of installation outside the United States (Bray et al., 2005). Like college students, many military personnel consider drinking an important part of leisure activities based on what they perceive as normative for the environment (Ames & Cunradi, 2004; Bray et al., 2005). The decision-making processes involved in drinking are also facilitated by the physical and social availability of alcohol that may make drinking a more acceptable and sometimes affordable activity (Ames & Grube, 1999). For instance, inconsistencies in minimum drinking age regulations can create confusion for many young adults, particularly those stationed outside the United States where personnel tend to be younger than those stationed within the United States (Bray et al., 2005). Most young troops stationed outside the United States are legally allowed to purchase, possess, or consume alcohol at age 18 while the minimum drinking age is 21 within the United States. Such inconsistencies may influence how young military personnel perceive both legal and social availability of alcohol, which may also contribute to the development of young military personnel's perception or reasons to think that the military culture is socially permissive toward drinking (Gruenewald & Millar, 1993; Ames & Grube, 1999; Frone,

1999). Young adults are developmentally still in an exploration phase of life and are often in pursuit of fun and stimulation. Besides easy accessibility and the fact that drinking is a widely accepted recreational activity in the military (Bray et al., 2005), the combination of pursuits of excitement and availability can lead to increased drinking among young adults.

Like college students who do not engage in problematic drinking behaviors, not all young adults in the military consume more alcohol or engage in heavy drinking after joining the military. This suggests that factors other than certain demographic or environmental variables in the military (e.g., joining the military, living conditions, military culture and drinking norms) also factor into young adult military personnel's drinking patterns (Bachman et al., 1997). One of the most compelling explanations associated with alcohol initiation, continuation, and relapse of people in general is the role of stress (Holcomb, 1981; Brown et al., 1995; Brady & Sonne, 1999; Bray et al., 1999). Individuals' stress reactions or stress management strategies are known to differ because people perceive the severity of stress differently and each person have their own way of coping in stressful conditions, which in turn affects stress outcomes (Rice, 1999). Many young people who join the military in their late teens and early twenties are impacted by unique military stressors that can occur as part of job duties, including frequent deployments and participation in combat or other wartime activities. Consequently, young military personnel may experience different military cultures in each installation, different cultures of host countries, and can also react differently to separation from family as a result of deployment or permanent change in station (PCS). Particularly important in understanding the drinking behaviors among military personnel

are the mental and physical challenges of military duties that are likely to elevate stress, and high stress levels are associated with excessive drinking, carelessness and injuries, abusiveness, and decreased job performance (Driskell & Salas, 1996; Orasanu & Baker, 1996; Rice, 1999; Bray et al., 2003). Given these factors, in studying the alcohol-use patterns of young military personnel, it is necessary to address the psychological processes associated with drinking, especially stress, coping, and stress outcomes, simultaneously with young adults' key developmental factors that may influence drinking. Therefore, this study focused on the associations between stress factors as well as impulsiveness and alcohol use and alcohol-related consequences in order to improve the understanding of alcohol using patterns of young military personnel. These factors are discussed in more detail in the literature review presented in Chapter II.

RESEARCH AIMS AND QUESTIONS

The study's principal aim is to develop and test a structural equation model of young male military personnel's alcohol use patterns using the public use data from the 2005 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel (see Figure 1). Patterns of drinking may vary depending on the kinds of factors included in a model. In this study, the term "pattern" refers to developmental and psychological influences on alcohol use and particularly considers multifaceted connections between stress factors, drinking motives, personality traits (i.e., impulsivity), alcohol use, and alcohol-related consequences (i.e., job performance).

Figure 1. Structural Equation Modeling of Stress, Drinking Motives, and Impulsivity Motivated Alcohol Use and Alcohol-related Consequences of Young Male Military Personnel (*indicates control variables)

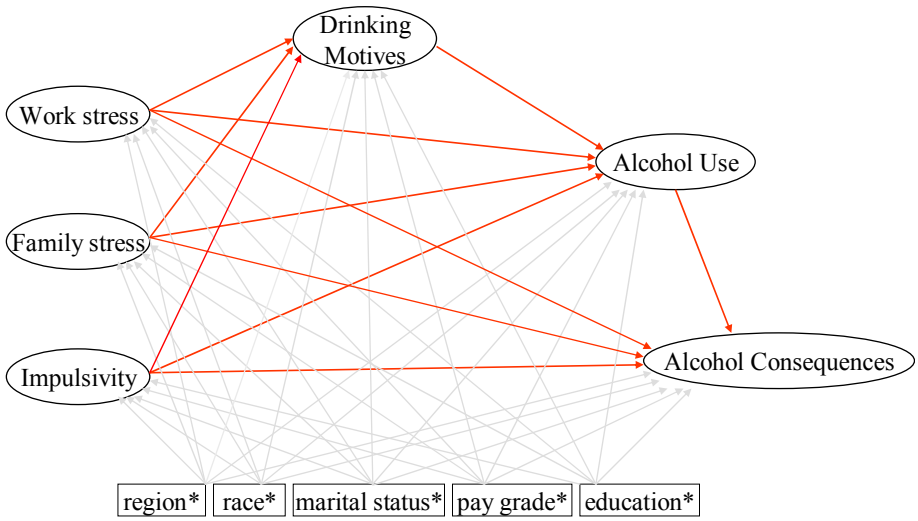


Figure 1 is a simplified visual presentation of the structural equation model. It includes information regarding: (1) the structural model that shows hypothesized linkages between six latent variables (i.e., work stress, family stress, drinking motives, impulsivity, alcohol use, alcohol-related consequences); and (2) the connections between control variables and the independent, mediating, and dependent variables. The measurement model, including all indicators (observed variables) that are used to construct each latent variable that are further described in later sections of the paper. The factors in the model, including indicator variables that compose each latent variable, were chosen selectively for inclusion based on an extensive literature review of factors associated with young adults' drinking as well as risk factors for alcohol use in general, despite some constraints by variables available in the secondary data set used in the study. Although factors other than those hypothesized in the proposed model undoubtedly contribute to understanding young adults' drinking behaviors of, the variables in the model are expected to facilitate an examination of young male military personnel's drinking behaviors and associated consequences. Only young males are to be included in the analysis primarily because there are known biological and psychological gender differences or disparities related to alcohol use initiation, continuation, and recovery. Men and women also tend to present different risk and protective factors as well as prevention and treatment needs (Davis & DiNitto, 2005). Therefore, focusing only on young males will not only create a homogeneous group that will produce a more accurate picture of drinking patterns of the military population, it will also promote a more gender-sensitive approach to understanding drinking problems in the U.S. military (the researcher plans to study women at a later date).

The major focus of the analysis is on the potential harms to young adults' in their job performances as a result of their drinking behaviors motivated by stress, impulsivity, and drinking motives. Therefore, the current study aims to examine the possibilities of mediated relationships between stress, impulsivity and alcohol use through drinking motives, and their effects on young adults' job performances. Mediating variables are often contrasted with moderating variables, which pinpoint the conditions under which an independent variable exerts its effects on a dependent variable. By calculating the total, direct, and indirect effect of the variables of interest, the researcher can identify and suggest a causal order as well as complete (or full) or partial mediation via drinking motives. Therefore, the mediation model will assist to explicate the mechanisms that underlie the relationship between stress, impulsivity, and alcohol use. The current study also examines a possible moderating effect of coping on the relationship between stress and alcohol use. Different from mediation, a moderating relationship can be thought of as an interaction between the moderating variable and each independent variable. The magnitude of the relationships between stress and alcohol use are hypothesized to be different depending on the level of coping.

To summarize, the general aim of this study is to develop a model of alcohol use that includes both developmental and psychological aspects of drinking behaviors of young males in the military. Using structural equation modeling (SEM), the study aims to:

(1) Examine young male military personnel's developmental and psychological factors that may influence alcohol use and alcohol-related consequences (i.e., job performance);

(2) Evaluate the model fit to assess whether or not the proposed model fits the 2005 DoD data and the usability of the proposed model in understanding alcohol use patterns among young male military personnel;

(3) Identify mediation effects of drinking motives in the relationship between stress and alcohol use; and

(4) Identify moderation effects of coping between high and low coping groups that may influence the relationship between young males' stress, drinking motives, impulsivity, alcohol use, and job performance.

To address these aims, the 2005 DoD Survey of Health Related Behaviors Among Military Personnel data set was used. The main research questions are:

(1) Are stress, drinking motives, and impulsivity factors useful in explaining the alcohol use and job performance of young adults in the military?;

(2) Do drinking motives mediate the relationship between work stress, family stress, impulsivity, and alcohol use?; and

(3) Does positive coping moderate the overall relationship between stress and alcohol use after controlling for region, race, marital status, education, and pay grade?

PUPOSE AND SIGNIFICANCE OF THE STUDY

This study is a secondary analysis of the 2005 DoD Survey of Health Related Behaviors Among Military Personnel. The study proposes an alcohol use model containing both developmental and psychological aspects of young adults' drinking. Primarily, the study is designed to assess the fit of the hypothesized alcohol use model. In addition, the model is tested for the mediating effects of drinking motives between stress factors and alcohol use. The study also makes examines coping levels to determine whether or not they moderate the relationship between stress and alcohol use. If there are significant effects, the study will identify paths that distinguish the high and low coping

level groups. By doing so, the assessment of the model will provide more specific information about the structure of drinking patterns or, more specifically, the effects of coping on young male military personnel's alcohol use patterns.

Current literature provides substantial information on the prevalence of heavy alcohol use and suggests key factors that may help in explaining the high alcohol use prevalence among young adult military personnel (e.g., regional differences, gender differences, stress factors, etc.). Methodologically rigorous military studies have provided descriptions of alcohol use and abuse trends and suggest needed policy changes. These descriptive analyses of young adults' drinking behaviors are useful in understanding the prevalence of alcohol use and its related consequences. However, despite empirical evidence that stress is highly related to alcohol consumption and that certain personality traits are also associated with alcohol use, it is unknown whether these conceptual linkages of stress and coping paradigms and linkages between personality traits and alcohol use suggested in the literature apply to the young military population, of which the majority are young males living and working in unique circumstances. In addition, alcohol patterns have not been explicitly studied in terms of coping styles and differences that coping style may elicit in alcohol use patterns.

The findings will build upon prior research by testing whether certain developmental and psychological factors are associated with alcohol use along with recommendations for reducing drinking problems. The findings may also contribute to identifying drinking patterns of young military personnel. This study is also unique in that the proposed model includes a developmental factor as well as major stress factors and drinking motives in relation to alcohol use with a focus on young male military

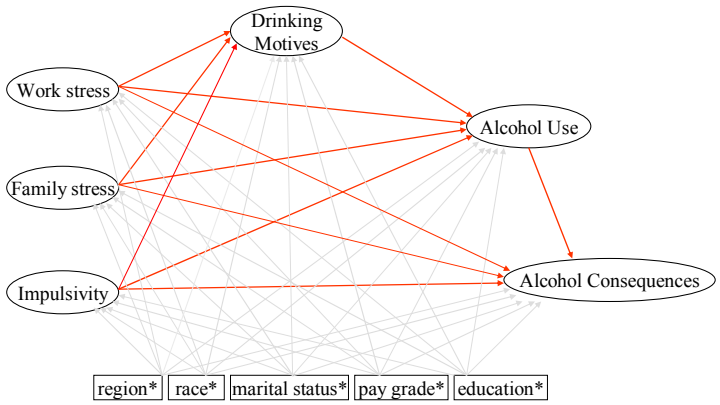
personnel. Given the differences between men and women in alcohol use levels, stressors, reasons for drinking, and other factors, this study uses a gender specific and sensitive approach to understanding the problem. The study also promotes methodological rigor and precision in alcohol research by using sophisticated statistical methods to better understand the alcohol-use patterns of the young male military population. Moreover, it may provide insight into what can be expected in terms of job performance due to stress, drinking motives, impulsivity, and alcohol use. From a clinical perspective, study findings may provide guidance for designing more effective alcohol prevention programs and tools to detect early warning signs of alcohol use and misuse and their potential harm to individuals, the military, and the community or regions where young military personnel are stationed, both in and outside the United States. It may ultimately help the military promote a culture that supports healthier lifestyles, consequently improving individual's well-being, job performance, and readiness of the U.S. military. Finally, the results may have implications for policy and regulations on leisure activities involving alcohol consumption that could reduce harm resulting from alcohol use and abuse.

CHAPTER II

LITERATURE REVIEW

This chapter does not aim to be exhaustive of all the current literature on known factors that influence young adults' drinking. It does aim to outline key factors associated with young adults' drinking and alcohol-related consequences that are relevant to the current study. Therefore, the review provides a synthesis of current literature on major variables or key factors integrated in the proposed model (see Figure 1). This chapter discusses: (1) key factors associated with alcohol use; (2) explanations of psychological predispositioning factors of young adults that influence alcohol use; (3) stress factors in general as well as those particularly relevant to military personnel and their connections with alcohol use and job performance; (4) the rationale for using each indicator in structuring the proposed latent variables; and (5) validation for the use of each demographic factor as a control variable in the proposed model.

Figure 1. Structural Equation Modeling of Stress, Drinking Motives, and Impulsivity Motivated Alcohol Use and Alcohol-related Consequences of Young Male Military Personnel (*indicates control variables)



WHO ARE YOUNG ADULTS AND WHAT IS YOUNG ADULTHOOD?

Drinking behaviors among young adults warrant special attention as this group is unique developmentally and psychologically and is prone to frequent engagement in risky behaviors. From a developmental perspective, noted psychologist Erik Erikson speaks of young adults as individuals aged 19 to 25 who individuate from parents and take on new adult roles expected by society (Newman & Newman, 2005). Erikson's key notion is that individuals must master tasks imposed on each developmental stage in order to successfully move on to the next developmental phase (Newman & Newman, 2005). In the developmental stage where transitions from adolescence to adulthood occur, individuals begin to solidify their identity and form ideas about their strengths, weaknesses, goals, occupations, sexuality, and gender roles. Young adults also seek love and compassion, and failure to achieve this need results in isolation (Newman & Newman, 2005). Arnett (2000) uses the term "emerging adults" to describe what Erikson refers to as "young adults." Arnett (2000), however, suggests that people in this age group have not yet finished the developmental processes emanating from the adolescent stage, particularly identity exploration. He describes this stage as one of instability where the individual is self-focused and feels "in between," but it is also a period which suggests "possibilities" for the individual. Therefore, Arnett argues that it is more appropriate to describe young people aged 18 to 25 who have not yet completed certain developmental processes as "emerging adults." Despite differences in what to call this developmental phase, both the terms "young adults" and "emerging adults" include individuals in a similar age range and account for overlapping key developmental roles.

This phase is also characterized by exploration that facilitates achievement of societal expectations about young adulthood.

There are a number of psychological predispositioning factors known as personality traits that are significantly associated with increased drinking during young adulthood, most notable risk-taking, impulsivity, and sensation-seeking. These are often considered similar concepts; however, impulsivity is a personality trait that is an antecedent of sensation-seeking in the neurological processes. In addition, young adults' brains, particularly the frontal cortex, are not yet mature enough to provide behavioral controls sufficient to prevent impulsive behaviors. Although such risk and sensation seeking behaviors of young adults can include deviant behaviors that violate social and/or legal norms (Arnett, 2000; Wood et al., 2001), most of these behaviors are considered functional aspects of developmental experimentation processes during the transition from adolescence to adulthood (Jessor, Donovan, & Costa, 1994; Arnett, 2000; O'Malley, 2005; White & Jackson, 2005).

It is particularly important to know about the processes involved in drinking during this developmental stage (Houghton & Roche, 2001). Human brains generally process drinking as a pleasurable experience; hence, having positive alcohol expectancies is a learned behavior (Houghton & Roche, 2001; McNeece & DiNitto, 2005). As a result, people are more likely to attach pleasurable rather than dangerous images to drinking (Brown, 1985; Mooney, Fromme, Kivlahan, & Marlatt, 1987; Smith, Goldman, Greenbaum, & Christiansen, 1995). Even more problematic is young adults' psychological tendency or inclinations to make decisions based on what they perceive as benefits from drinking rather than risks (Goldberg, Halpern-Felsher, & Millstein, 2002).

Young adults also overestimate their peers' drinking behaviors (Borsari & Carey, 2001). Therefore, their perceptions of drinking norms and overall behaviors are likely to be sculpted by influences in their surroundings, including friends and social groups, regardless of their race or ethnicity (Andrews, Tildsley, Hops, & Li, 2002; McNeece & DiNitto, 2005).

YOUNG MILITARY PERSONNEL vs. COLLEGE STUDENTS

Both college students and young military personnel tend to show higher prevalence rates of alcohol use and abuse compared to non-or part-time college students of the same age (Bray et al., 1991, 2003, 2005; Ames & Cunradi, 2005). In addition, young military personnel consume significantly more alcohol compared to civilians of same age as well as older service members (Bray et al., 1991; Bray et al, 2003; Ames & Cunradi, 2005). Moreover, male military personnel are twice as likely as male civilians to be heavy drinkers (Bray et al., 1991) and four times more likely to be heavy drinkers than female military personnel (Bray et al., 2003). Currently, approximately 87 percent of new U.S. active duty military recruits are young adults aged 18 to 24, and a steady increase of young adults are entering the military at age 18 (Substance Abuse and Mental Health Services Administration, 2004). The numbers of females in the military has grown gradually and now stands at 16 percent of all military forces; however, the majority of all armed forces members are still men (Military Demographics, 2005). Therefore, young military personnel will continue to be at higher risk for alcohol use and alcohol-related consequences than any other population in the United States if sufficient attention is not given to alcohol prevention.

The current literature lacks a model of alcohol-use patterns that specifically targets the young military population. Studies have focused mostly on factors associated with drinking behaviors among college students even though male military personnel have high rates of alcohol use and alcohol-related consequences. Although there are similarities and differences on drinking behaviors between young military personnel and college students, these populations are at very similar physical and developmental stages. Therefore, studies on college drinking may be used to draw inferences as we try to learn more about alcohol consumption among young military personnel.

Historically, college groups have stood out among young adults as problem drinkers due to many external temptations that attract them to drink as well as frequent engagement in risky and impulsive behaviors related to or as reasons for drinking. According to the Substance Abuse and Mental Health Services Administration (2006), young adults aged 18 to 22 who are full-time college students are more likely than their peers (i.e., part-time students or non-college groups) to use alcohol, binge drink, and engage in heavy drinking. In fact, 38 percent of full-time students reported heavy drinking compared to only 13 percent who were not enrolled full-time. Presley et al. (2002) suggest that the transitional experiences to college are likely to have some impact on young adults' drinking norms and drinking behaviors. For example, the higher drinking prevalence among young college students compared to non-college population is largely accounted for by living arrangements, such as type of residence (i.e., students living in dorms or apartments with other college students), institution size, and campus location or region that tend to differ from the living environments of those who do not attend college (Presley et al., 2002). Other college factors associated with drinking

include organizational variables such as affiliations (i.e., historically black institutions, women's institutions) or presence of a "Greek" system (i.e., fraternities and sororities), and other external variables, including pricing and availability of alcohol outside campuses (i.e., bars and clubs) (Presley et al., 2002).

Like full-time college enrollment, joining the military is also significantly associated with increases in heavy drinking among young people (Bachman et al., 1997). Young adults who join the military are in many ways demographically very similar to the high-risk college student population in terms of factors such as age and marital status as well as living conditions. For instance, heavy drinkers in the U.S. military are mostly males aged 25 or younger, non-Hispanic White, and unmarried (Bray et al., 2003). Young people who consume alcohol in the military, however, generally have less years of education. Additionally, young military personnel who are married are more likely to be unaccompanied by their spouse or children than young married college students.

Although youth in the military may not be exposed to some of the same environmental risk factors as college students, such as certain campus characteristics like the presence of fraternities and sororities (Presley et al., 2002), their living conditions and age characteristics are quite similar to those of college groups who live in dorms or away from their family and become embedded in a young community that can expose them to an environment that facilitates increased drinking (Substance Abuse and Mental Health Services Administration, 2004). Young military personnel are also influenced by military beliefs and norms that encourage drinking, similar to the ways that college students are influenced by unique external risk factors such as a campus drinking culture and peers who drink (Ames & Cunradi, 2004). For instance, many military personnel perceive

drinking as a way to "fit in" with their peers (Ames & Cunradi, 2004; Bray et al., 2005). However, the stakes of heavy drinking in the military may be higher, or at least different, than they are for college students. The hazards may impact individuals' well being as well as the entire military community in terms of lowered job performance and combat readiness.

KEY FACTORS ASSOCIATED WITH YOUNG ADULTS' DRINKING

The previous section showed a few different multivariate models that incorporated demographic, developmental, as well as psychological factors that are suggested to influence alcohol use and alcohol-related problems. To facilitate a better understanding of the conceptualization of the proposed model presented in the current study, this section provides more detailed information on various important factors that are associated with young adults' drinking including some of the variables that were not discussed within the context of the example models.

According to Conger (1956), drinking processes can be understood from a tension relief point of view. Because people drink to experience emotional relief from stressors in tension-provoking circumstances, Conger (1956) suggested a direct relationship from stress to alcohol consumption; furthermore, the more people experience stress, the more they drink. Despite the appeal of such a parsimonious theory, numerous studies have suggested that the drinking process is more complex and that a variety of biological, psychological, and environmental factors simultaneously influence drinking. Newer studies have also utilized models that are more complex and include circumstantial factors, i.e., mediating or moderating factors, to more accurately explain the relationship between stress and alcohol use. For instance, Cooper, Russell, and George (1988) used

Lazarus and Folkman's (1984) transactional model of stress which emphasizes the concept of coping. Furthermore, in understanding young adults' drinking behaviors it would be negligent to overlook developmental factors. A more holistic approach to alcohol use seems best in understanding young adults' alcohol-using behaviors.

Among young people, race, ethnicity, and culture (Caetano & Kaskutas, 1995), gender (Davis & DiNitto, 2005), marital status (Bachman et al., 1997; Baer, 2002), and employment status, including joining the military (Bachman et al., 1997), are also related to drinking. In addition, having new freedom (Bachman et al., 1997; Arnett, 2000; Wood et al., 2001), peer influences (Borsari & Carey, 2001; Andrews et al., 2002; Perkins, 2002) and social networking (Bullers, Copper, & Russell, 2001), and positive alcohol expectancies (Brown, 1985; Mooney et al.,1987; Smith et al., 1995; Goldberg et al., 2002; Schulenberg & Maggs, 2002) are known to influence young adults' drinking. Personality characteristics or traits also seem important in explaining heavy drinking among young adults. Common psychological predisposing factors or personality traits pertinent to young adults are thought to impact drinking in young adulthood including sensation-seeking, impulsivity, or risk-taking (Jessor et al., 1994; Arnett, 2000; O'Malley, 2005; White & Jackson, 2005). Psychologically, stress factors, drinking motives, positive alcohol expectancies, as well as coping strategies are also associated with drinking regardless of age group (Holcomb, 1981; Brown, 1985; Mooney et al., 1987; Brown et al., 1995; Smith et al., 1995; Brady & Sonne, 1999; Bray et al., 1999). The following section uses Green and Kreuter's (1999) health promotion planning model as a conceptual basis for grouping an array of factors suggested in the alcohol research literature to influence young adults' drinking. The three key grouping variables are (1)

pre-dispositioning, (2) enabling, and (3) reinforcing factors, that interact to shape health behaviors at both individual and environment levels.

Predispositioning factors

Genetic Predisposition and Family History of Alcoholism

Individuals with one or more close blood relatives who have alcoholism are said to have or "to be positive for" a family history of alcoholism. Having a positive family history of alcoholism apparently increases the chance of developing alcoholism. For example, Schuckit and Smith (1996) found that sons of alcoholic fathers are three times more likely to abuse alcohol than sons whose fathers who are not alcoholic. A major set or category of theories that has been used to explain familial alcoholism is genetic predispositioning factors.

Two mechanisms that have been discussed in the literature in terms of the etiology of familial alcoholism are level of response to alcohol and the age of onset of drinking. Some researchers have noted that sons of alcoholics often have a lower response to alcohol, i.e., a different level of sensitivity to alcohol than others (Vogel-Sprott & Chipperfield, 1987; Schuckit, 1998; Schuckit & Smith, 1996, 2000; Morzorati, Ramchandani, Flury, Li, & O'Connor, 2002). This means that at the same blood alcohol level, individuals with a family history of alcoholism may initially report greater alcohol effects than those without a family history of alcoholism. However, those with a family history of alcoholism seem to develop tolerance quickly and soon report less subjective feelings of intoxication than those without a positive family history of alcoholism. Therefore, individuals with a low response to alcohol will require more drinks to produce the same level of perceived effects than others. Schuckit and Smith (1996) also reported

that a lower response to alcohol among sons of alcoholics is associated with higher levels of alcohol consumption. A clinical study by Morzorati et al. (2002) also showed that although people with a family history of alcoholism tend to report greater feelings of intoxication (measured by the Biphasic Alcohol Effects Scale and Sensation Scale) after initial exposure to alcohol compared to those without a family history of alcoholism, these individuals tend to quickly develop tolerance as they adapt to alcohol's physiological effects, and with tolerance their perceived effects of intoxication no longer significantly differed from those without a family history of alcoholism. These results support the development of tolerance that may increase drinking in people with a family history of alcoholism (Schuckit & Smith, 1996; Morzorati, et al., 2002). In terms of indentifying particular genes that affect individuals' likelihood of becoming alcoholics, Mulligan et al.'s (2006) research was conducted on rats, but it provides new insight into understanding how certain genes can predispose rats to either high or low alcohol consumption. In human research, Wilhelmsen et al. (2003) showed that a low-level of response to alcohol may be associated with particular chromosomal regions (chromosomes 10, 11 and 22) in the human genome. Twin studies on alcohol use and abuse have also implied a genetic predispositioning factor (Liu et al., 2004; Kaprio et al., 2006).

Although Morzorati et al. (2002) and Schuckit and Smith (1996) report that those with a family history of alcoholism tend to develop tolerance more quickly and report less subjective effects of alcohol, alcohol may have greater effects on their behavioral task performance. For example, Vogel-Sprott and Chipperfield (1987) examined behavioral effects of alcohol among young male college students with and without a

family history of problem drinking. Study participants' performance was compared between their sober stage and at near peak blood alcohol levels. While no significant differences were found in the subjective effects among individuals with or without a family history of alcoholism, at peak blood alcohol levels, those with a family history of alcoholism consistently showed greater impairment than those without a family history of alcoholism. Since the study participants with and without a family history of alcoholism were matched by age, body weight, and quantity of drinks typically consumed on social occasions, it seems reasonable that a positive family history of alcoholism is a key factor in producing greater behavioral sensitivity to alcohol. However, they also suggest that such differences in task performance may mainly be due to the differences in the level of alcohol expectancies that may have resulted in greater behavioral effects of intoxication for those with a family history of alcoholism.

In addition, individuals who are positive for a with a family history of alcoholism generally initiate drinking earlier in life, and those who begin drinking at early ages have a greater chance of developing alcohol use disorders (Sher et al., 1991; Schuckit, 1998, 2000; Wilhelmsen et al., 2003; Capone & Wood, 2008). Capone and Wood (2008) studied alcohol use and related problems among college students who are children of alcoholics. The results consistently support a hereditary risk by showing that family history of alcoholism is significantly associated with greater alcohol use, but this relationship is mediated by an earlier onset of drinking. The results, however, do not support the literature on the relationship between family history of alcoholism and level of response to alcohol as previously discussed. Capone and Wood (2008) noted that the inconsistent findings is likely due to sample bias as 72 percent of the study sample was

women, and, thus, the sample used may have failed to clearly illustrate the relationship, which is shown to be more prominent among males.

Dawson (2000) studied males with and without a family history of alcoholism according to whether they initiated drinking before age 18 or at age 18 or later. He compared those who reported no alcoholic relatives with those who reported that 25 percent (or one in four) of their relatives were alcoholic. Among those who initiated before age 18, those with the alcoholic relatives were 1.8 times more likely to develop alcohol dependence in early adulthood (i.e., within 5 to 9 years after the initiation of alcohol use). Among those who initiated drinking at age 18 or older, those with the alcoholic relatives were about 2.4 times more likely to develop alcohol dependence within 5 to 9 years after the initiation of alcohol use. Thus, male adolescents who reported that 25 percent of their relatives were alcoholics and who initiated drinking at age 18 or older had a greater chance of developing alcohol dependence than those who initiated drinking before age 18. These findings may be contrary to the literature on the relationship between earlier age at onset of drinking and alcoholism; however, the results are consistent with the literature that indicates that those with a family history of alcoholism are at greater risk factor for developing alcohol dependence later in life. Regardless of some of the inconsistencies in the literature, these findings suggest that a genetic predisposition could determine how people psychologically and physically experience alcohol's effects.

Genetics, however, may only partially explain alcohol use patterns. Grucza et al. (2006) noted that family history itself is only one of many factors that predict alcoholism. Their study suggests that an individual's personality traits moderate the relationship

between parental alcoholism and his or her own risk for alcoholism. In short, high novelty seeking is a strong risk factor for alcoholism among children of alcoholics, while low novelty seeking may diminish the risk of becoming alcoholic. Similarly, Lovallo, Yechiam, Sorocco, Vincent, and Collins (2006) noted that young adults' hereditary risks are expressed through their behaviors. They suggest that an individual who comes from a family with a history of alcoholism *and* has a tendency to take risks is at higher risk for future drinking and drug use problems compared to an individual who shares the same familial risk but has a lower propensity for risk-taking. Therefore, although genetics may be an important predispositioning factor, it seems plausible that personality traits require special attention in order to understand alcohol use patterns, prevalence, and problems among young adults. These personality traits are discussed further in the section on psychological factors associated with young adults' drinking presented later in this chapter.

Sociodemographic Factors

Race/Ethnicity

The Substance Abuse and Mental Health Services Administration's 2006 recent survey shows that Whites aged 12 and older report the highest rates of current alcohol use (57 percent) compared to any other ethnic group. This figure has been quite consistent over the years. As Caetano and Kaskutas (1995) report, Whites and Native Americans drink the most, while African-Americans and Asians drink the least, and Hispanics tend to be in the middle range. Peak drinking age is also related to race/ethnicity: Whites' drinking peaks at ages 19-22, while African-Americans and Hispanics peak at later ages and have longer peaks than Whites. Among military personnel, in 2002, for instance, 20

percent of non-Hispanic Whites reported heavy alcohol use compared to 13 percent of non-Hispanic African-Americans, 19 percent of Hispanics, and 16 percent of others (Bray et al., 2003). This report is also consistent with the military survey administered in 2005 (Bray et al., 2006). Twenty percent of Whites, 12 percent of African-Americans, 23 percent of Hispanics, and 16 percent of others (such as Native Americans or Asians) reported heavy drinking. Even with controls for other sociodemographic characteristics (i.e., service type, gender, race/ethnicity, family status, pay grade, and region), non-Hispanic Whites were the group most likely to be heavy drinkers in the military (Bray et al., 2003). Although Hispanics showed close to an equal probability of being heavy drinkers as non-Hispanic Whites (odds-ratio of .91 to 1), African-Americans and others showed significant lower probabilities (Bray et al., 2003).

Compelling arguments have been made about how culture sculpts drinking attitudes and norms. For example, many Whites are reported to see heavy drinking as part of lifestyle in youth, while Hispanics may be more likely to consider heavy drinking as an a privilege earned in adulthood as an achievement into maturity (Caetano & Kaskutas, 1995). Despite such differences, McNeece and DiNitto (2005) suggest that ethnic and cultural influences should not be insensitively used to categorize ethnic groups into those who present more or less problems. This is because many factors in addition to race or ethnicity may affect drinking, making conceptualization, operationalization, and measurement of cultural influences on drinking difficult and subject to hindering accurate findings (McNeece & DiNitto, 2005). Survey instruments may lack construct validity as terminology can have different nuances for different groups (McNeece & DiNitto, 2005). Ethnic groups may define alcohol use and alcohol problems differently, and defining

drink levels by ethnic groups solely can be problematic. Moreover, comparisons are usually made using Whites as the reference group, which may entail embedded biases in research findings (McNeece & DiNitto, 2005). Although consideration of ethnic differences in alcohol consumption is important, it should be understood in the context of other factors as well (McNeece & DiNitto, 2005).

Gender

Gender matters in many aspects of the current study because it is related to various factors associated with drinking. Gender is suggested to be one of the four strongest demographic predictors of college drinkers (i.e., ethnicity, age, gender, marital status, socioeconomic status, religious affiliation, number of family generations raised in the United States, and family history of alcoholism) other than ethnic background, religiosity, and socioeconomic status (Brown, 1985). Moreover, gender disparity tends to increase as young people move from childhood to adolescence and young adulthood which then explains significant differences in the alcohol use prevalence rates (Johnston, O'Malley, Bachman, & Schulenberg, 2004). Alcohol use and misuse prevalence rates are reported considerably lower for women drinkers than men. Women also exhibit less problematic alcohol-using behaviors and negative consequences than men drinkers, particularly in the military (Bray et al., 1999; O'Malley & Johnston, 2002; Bray et al., 2003; Bray et al., 2005; Substance Abuse and Mental Health Services Administration, 2006). In fact, male military personnel are twice more likely to become binge and heavy drinkers than female military personnel (Bray et al., 2005).

Gender is also significantly associated with stress at work, particularly in the military environment, which is predominant male. While some stress factors are equally

important to military men and women alike (i.e., stressful work, separation from family, stressful interpersonal relations, and deployment), there are gender differences in certain sources of stress. For example, women report higher stress than men resulting mostly from changes in personal life (21% vs. 13%) but also in problems with coworkers (15% vs. 10%), supervisors (14% vs. 11%), and conflicts between military and family responsibilities (15% vs. 12%) (Bray et al., 2003). In addition, women's experience of sexual harassment is also reportedly a significant stressor, second only to general work-related stress, and is a significant issue in the military (Bray et al., 1999). In 2002, more than 40 percent of female military personnel reported that "being a woman in the military" is a "great deal of" or "fair amount of stress" (Bray et al., 2003). This figure is higher than the same survey administered in 1995 in which 33 percent of women responded likewise (Bray et al., 1999). Consequently, sexual harassment of female military personnel is given special attention these days because women have gained broader opportunities to join the military (women now comprise 16 percent of the armed forces) and due to more outcries and highly publicized sexual assault cases (Military Demographics, 2005).

The psychosocial realities of women and men drinkers also differ significantly (Nelson-Zlupko, Kauffman, & Dore, 1995; Covington, 2002; DiNitto, Webb, & Rubin, 2002; Davis & DiNitto, 2005). Females generally experience more discrimination due to their drinking because of social stigma, double standards, and differing expectations for men and women (Carter, 1997). In fact, women tend to be more criticized or seen as more deviant than men across ethnic groups for alcohol or drug use and related problems (Carter, 1997; Covington, 2002; Davis & DiNitto, 2005). Women's alcohol consumption

also differs from men in relation to genetic factors, physiological differences (i.e., metabolism and effects of alcohol), and sexual issues associated with drinking (Davis & DiNitto, 2005). For instance, after consuming the same amount of alcoholic beverages, women's blood alcohol concentrations are likely to be higher than men. Thus, the same definition of "heavy drinking" should not be applied to both men and women because it does not account for biological differences in alcohol metabolism between the sexes (Davis & DiNitto, 2005). Various psychological antecedents of alcohol use are more prominent among female drinkers. For example, women who were sexually abused during childhood are more likely to drink, have alcohol-related problems, or suffer alcohol dependence symptoms. Research on alcohol abuse among men who were child sexual abuse victims is much more limited. Explanations of women's alcohol use are even more complicated as more women experience co-occurring disabilities than men, as well as histories of physical and/or sexual abuse, such as sexual assault, and intimate partner violence, which have significant associations with alcohol use (Davis & DiNitto, 2005).

In addition, male partners play a significant role in women's introduction to and continued alcohol use to maintain their relationships (Davis & DiNitto, 2005; Rivaux, Sohn, Armour, & Bell, 2008). A recent qualitative study on women's recovery issues also suggested that women tend to perceive their involvement with alcohol or drugs similar to being in a relationship with a significant other; therefore, and substances are often used to maintain or substitute for a relationship (Rivaux et al., 2008). Moreover, women in recovery tend to believe that alcohol and drug use help them deal with feelings of sadness, anger, or insecurity, or experiences such as past abuse, mistakes, or

abandonment, even though they understand that such coping behaviors are for immediate rather than long-range distraction (Rivaux et al., 2008). However, these ideas of misconceived perceptions of the benefits of alcohol are consistently reported in alcohol research in terms of drinking motives to regulate negative emotions, regardless of gender. Therefore, given that gender differences entail biological, psychological, and social properties, Davis and DiNitto (2005) suggest that alcohol studies and treatment strategies incorporate a gender sensitive approach that accounts for such differences.

Marital Status and Parenthood

Marriage or other partnering and parenthood are a part of young adults' developmental processes that are important in understanding alcohol use patterns. For instance, being single and without children are associated with heavier drinking among young adults (Bachman et al., 1997; Wood et al., 2001; Baer, 2002). During the transition from adolescence to adulthood, young people gain more freedom and have less supervision because they are more likely to become physically separated from their family members. Therefore, unless they are married or have children of their own, these young adults are less likely to be constrained by family or familial responsibilities (Bachman et al., 1997; Wood et al., 2001; Baer, 2002; O'Malley, 2005). For example, Bachman and his colleagues (1997) show that marriage and parenthood have strong effects on increased alcohol consumption for both men and women alike. Their study confirmed that being married after high school graduation significantly affected drinking behaviors as married men drink less than those in different marital living arrangements, such as living with parents, in a dormitory, or alone. Similarly, married women showed decreases in both current and heavy drinking; however, it is suggested that the reduction

in women may mainly be due to having more domestic and parental responsibilities as primary caretakers. Pregnancy, in particular, was a significant factor in reduced drinking among women. Being engaged also seems to have similar associations with reduced drinking, while becoming divorced predicted increased drinking. Similarly, in the general population, people who are single tend to engage more in risky behaviors than those who are married (Bachman et al., 1997; Baer, 2002).

Though there are suggestions that marital status is no longer associated with increased or decreased alcohol consumption, especially when individuals reach a certain level of drinking, Matzger et al. (2004) agree that marital status is an important factor but only for those who are less likely to be problem drinkers. They reported that marital status did not seem to affect problem drinkers and alcohol dependent persons as it did less problematic drinkers. They argue that other individual predisposing characteristics (e.g., age, income, education, and age of first alcohol use), problem severity, and social predisposing characteristics (e.g., family history of an alcohol problem, the size of heavy alcohol or drug using social networks) are more important in predicting long-term alcohol consumption than marital status among more problematic drinkers or people which alcohol dependency. Despite the inconsistencies reported in the groups of young adults whose drinking is affected by marital status, it seems fair to conclude that marital and parental status play some role in young adults' alcohol consumption either as a demographic or developmental factor. Marital status is particularly relevant in the study because currently, many recruits are men who enter the military as young as age 18 and they are less likely to be married than their civilian counterparts; thus, the military

population is composed largely of young single men who have a high propensity for drinking (Military Demographics, 2005).

Employment Status, Joining the Military, or College Enrollment

The impact of being employed, including joining the military, and college enrollment was discussed in greater depth in the previous section on similarities and differences between college and young military drinking. Therefore, this section provides only a brief summary of the impact of these factors on alcohol use. After high school graduation unemployed men and women generally significantly reduce their drinking (Bachman et al., 1997). Young adults employed after high school tend to drink more often but tend to drink less heavily when they do drink compared to those who join the military or enroll full-time in college who drink less often but drink more heavily when they do drink (Bachman et al., 1997). Drinking prevalence is the highest among military population: 54 percent of all young military personnel engage in binge drinking and 33 percent in heavy drinking (Bray et al., 2003). Such high prevalence in the military may be understood from a transitional processes perspective that is punctuated by the stresses that occur as one moves from a civilian to military life (Hollingshead, 1946) as well as the stress-provoking physical and mental challenges of the military environment and culture that may prompt increased drinking (Ames & Cunradi, 2004). Although joining the military can be an important factor associated with increased drinking behaviors, this factor alone is unlikely to explain increased or heavy drinking. Rather, a combination of factors may intensify alcohol consumption of young adults in the military as it does the college population.

Education Level

Given the gradual increase in the number of young people who join the military as young as at age 18, the highest level of education of approximately 99 percent of young people in the U.S. military is a high school diploma or its equivalent (Bray et al., 2003). For those military personnel deployed overseas, education level tends to be even slightly lower than among those stationed within the United States (Bray et al., 2003). Moreover, according the 2005 DoD Survey of Health Related Behaviors Among Military Personnel report, young military personnel who have a high school education or less are about 1.8 times more likely to become heavy drinkers than those with college graduate or higher (Bray et al., 2005). The findings are consistent with the report from 2002 DoD Survey of Health Related Behaviors Among Military Personnel which show that those with a high school education or less were significantly more likely to become heavy drinkers than those who graduated from four-year college or higher (ratio of 1.6 to 1) (Bray et al., 2003). Therefore, it is fair to conclude that education level should be included as a control variable in the alcohol use model.

Military Pay Grade

Drinking, especially heavy drinking, seems to be most prevalent among those in lower military pay grades, i.e., E1 to E6 (Bray et al., 2003). For instance, in 2002, about 31 percent of those at lower pay grades E1 to E3 (Enlisted rank) reported heavy drinking, followed by 19 percent of those in pay grades higher E4 to E6 (Enlisted rank). When the odds-ratio for these two pay groups were compared in reference to the highest pay group, i.e., O4 to O10 (Officer rank) after adjusting for sociodemographic factors (i.e., service type, gender, race/ethnicity, family status, pay grade, and region), those in E1 to E3 were

six times more likely to be heavy drinkers, and those in E4 to E 6 grades were four times more likely to be heavy drinkers compared to officer rank group (the highest pay groups). The prevalence rates are also consistent in year 2005. In 2005, however, odds-ratio was very similar between those in E1 to E3 and E4 to E10 (4 to 1 vs. 5 to 1), but still significantly higher than the officer rank (the highest pay groups) to become heavy drinkers (Bray et al., 2006). This figure may be due to the fact that new recruits start at the lowest pay rank, i.e., E1, and younger personnel are most likely to be concentrated in these ranks unless they have a college degree at the time of enrollment. In the case of enlisted rank positions (i.e., E1 to E6), pay grade is nearly synonymous with chronological age of military personnel. However, about 5 percent of the military are composed of officer rank young military personnel which is equivalent to approximately 17,637 young people. Therefore, pay grade may be controlled for to obtain a clearer picture of the drinking patterns among young military personnel.

Psychological Factors

Stress

Despite a notably high prevalence of drinking and heavy drinking in the military, not all young adults in the military engage in heavy drinking or increase their alcohol consumption after joining the military. In this regard, psychological factors are often discussed in explaining drinking behaviors. One of the most compelling explanations associated with alcohol initiation, continuation, and relapse among those who with alcohol dependence is stress (Holcomb, 1981; Brown et al., 1995; Brady & Sonne, 1999; Bray et al., 1999).

Stress is a physiological and psychological response to any change that alerts individuals to either adapt to or avoid circumstances that are the source of stress, also known as the "fight-or-flight" response in the brain and the body (Rice, 1999). When the body senses danger, the hypothalamus, a small part of the brain, is set off and the sympathetic nervous system responds by releasing chemicals including adrenaline, norepinephrine, and cortisol. These hormones are activated to either flee or fight the stressful situation. Therefore, emotional states such as anxiety, depression, guilt, anger, sadness, irritability, and sense of abandonment are in fact the symptoms of stress (Rice, 1999). Stress warning signs and emotional symptoms include moodiness, agitation, restlessness, irritability, and depression or general unhappiness. Physical symptoms of stress include upset stomachs, rapid breathing, headaches, and sleep/eating disturbances. Some of the behavioral symptoms include withdrawal, eating more or less, sleeping too much or too little, using alcohol, cigarettes or drugs to relax, carelessness and injuries, abusiveness, and decreased job performance (Rice, 1999).

Stress can be divided into two types. A certain amount of stress that is tolerable for individuals to adapt to is called "eustress," a positive, desirable form of stress that can motivate people and produce better outcomes (e.g., stress caused by an upcoming test can motivate students to study harder). On the other hand, if the stress increases to a point where individuals cannot benefit from it, it becomes "distress," a negative form of stress that can interfere with various life domains (Rice, 1999). This curvilinear relationship between stress and human performance or efficiency is also known as the *Yerkes-Dodson Law* (Yerkes & Dodson, 1908; Xie & Johns, 1995). The model explains how stress responses and performance can vary depending on the level of stress. Accordingly,

performance or efficiency increases when stress increases but to a tolerable level. After that point, performance dramatically decreases (Rice, 1999). For instance, high stress levels or stress that exceeds one's threshold is likely to negatively impact job performance (Driskell & Salas, 1996; Orasanu & Baker, 1996; Bray et al., 2003).

There are various types of stress factors. Fenell and Fenell (2003) suggested that changes in family life, events that affect self-esteem, job and assignment changes, relocations, and financial problems all contribute to psychosocial stress for both military and non-military people. Military personnel are also exposed to special physical and mental conditions that can intensify alcohol consumption (Polich, 1979; Holcomb, 1981; Bray et al., 1991). Extreme environmental or physical conditions related to certain military duties, such as noise and weather conditions, dangers and threats, fatigue/sleep deprivation and sustained and continuous operations, heavy workload, and exposure to combat stress are examples of stress-elevated conditions (Bray et al.,1999; Bray et al., 2003; Noy, 1991; Orasanu & Backer, 1996). Additional stressful conditions include the mental challenges of military jobs, extended or overloaded military duties due to personnel shortage, and conflicts between military and family responsibilities (Bray et al., 1999). Moreover, military personnel with deployment (i.e., all military activities including the change from a cruising approach or contact disposition to a disposition for battle in the naval forces, the movement of forces within operational areas, the outer positioning of forces into a formation for battle, or the relocation of forces and equipment and supplies to desired operational areas) experience exhibit higher alcohol use than non-deployed personnel (Federman, Bray, & Kroutil, 2000). Based on the Department of Defense 2007 report on regional areas, the U.S. military is deployed in more than 150

countries around the world, with more than 369,000 of its nearly 1.4 million active-duty troops serving outside the United States and its territories. In the most recent study on health behaviors among military personnel, major stressors identified by military personnel were related to work (i.e., increased workload), separation from family, interpersonal relations, and deployment (i.e., the placement of troops or the distribution of forces in preparation for battle or work) (Bray et al., 2003). A central issue associated with such high stress levels is that men employed in high-strain jobs (i.e., having high psychological demands and little control over their work situation) are as much as 28 times more likely to develop an alcohol use disorder than those who are employed in low-strain jobs (Crum, Muntaner, Eaton, & Anthony, 1995). Therefore, researchers give attention to stress factors and how individuals perceive stress, particularly for those working in high-risk work environments such as the military (Driskell & Salas, 1996).

Hollingshead (1946) suggests that young adults perceive or experience significant amount of stress during the transition process from civilian status to military life. He argued that this distinctive adaptation process from civilian life to the military life (and vice versa) can create stress because the transition involves modification of their values from an independent person to one more dependent on hierarchy and orders. From a developmental perspective, any transitioning process induces high levels of stress for young adults because they need to seek opportunities for independence during identity exploration and establishment, while they are simultaneously expected to take on adult roles to master maturity (Arnett, 2006). Within the military context, a special circumstance of stress is the anticipation or fear of war. This phenomenon, also known as combat stress, is described as a combination of fear of war combined with other stress

factors (Driskell & Salas, 1996; Orasanu & Backer, 1996). Evidence shows that prior combat experience elevates deploying soldiers' somatic and affective symptoms (Beckham et al., 1998; Killgore, Stetz, Castro, & Hoge, 2006). As a matter of fact, studies show that substantial numbers of war veterans suffer post traumatic stress disorder (PTSD) or depression, and that the symptoms of these disorders often manifest as psychological and physical problems that make coping with daily life difficult (Beckham et al., 1998; Sharkansky et al., 2000; Ikin et al., 2006). Moreover, many war veterans suffering from PTSD engage in negative coping behaviors such as isolation, drugs or alcohol use, violence, or various self-destructive behaviors as a way to address problems, although such actions may only exacerbate the distressful situation (Ruzek et al., 2007). The following sections discuss different sources of stress or stressors.

Work stress. Researchers suggest that physical and psychosocial qualities of the work environment or work stress are significantly associated with employee alcohol use as well as lowered job performance (Ames & Janes, 1992). Specific behavioral symptoms of work stress include procrastination, work avoidance, and absenteeism, lowered performance and productivity, increased alcohol and drug use and abuse, increased risk-taking behaviors (including reckless driving and gambling), aggression, deteriorating relationships with family and friends, and suicide or attempted suicide (Rice, 1999).

Work or job stress is defined as job features that pose a threat to the worker or work (Lee & Ashforth, 1996). Threats include excessive work demands, boredom, lack of participation in decision-making, and interpersonal conflict with supervisors and coworkers (Ames & Janes, 1992). Job conditions, role stress such as ambiguity in role identification, gender-related complications such as sex bias or sexual harassments,

career development, organizational structure, and home-work interference can also cause work-related stress and poorer job performance (Rice, 1999). For instance, the periodic DoD Survey on Health Related Behaviors Among Military Personnel contains questions pertaining to respondents' perceived stress about performance ratings, increases or decreases in work load, and conflicts between family and military duty. In the most recent, i.e., 2005, DoD survey, 38 percent of those who reported higher levels of work stress worked below general performance compared to 20 percent of those in the moderate/low stress group (Bray et al., 2006). Results are consistent with the 2002 survey administered to a different cohort sample. Military personnel in the 2002 survey who exhibited high stress levels were about twice as likely as those with low stress levels to work below normal job performance levels (44% vs. 25.0%) (Bray et al., 2003). High-stressed personnel were more likely to experience illnesses, injuries, and accidents in the workplace than moderate/low-stressed personnel (11% vs. 5%) (Bray, et al., 2003).

In addition to stress directly related to the nature of the work or job conditions, interpersonal stress at work is also important to consider. For example, stress resulting from conflicts or strains from inability to establish or maintain good relationships with supervisors or coworkers is also suggested to be important in predicting job satisfaction and performance (Ames & Janes, 1992; Rice, 1999). For example, in the 2002 DoD Survey of Health Related Behaviors Among Military Personnel, questions about interpersonal stress were asked particularly in terms of relationships with coworkers as well as supervisor. On average, about 11 percent (including both men and women) reported problems with coworkers and supervisors (Bray et al., 2003). Therefore, since stress is associated with alcohol use and abuse, work stress, including interpersonal stress

at work, should be discussed as it relates to alcohol use as well as alcohol-related outcomes in studying alcohol use patterns.

Family-related stress. Family stress is defined as pressure that disrupts or changes the family system (Rice, 199). It is different from stress experienced at the individual level because a family is a social cluster of people with special connections, thus requiring collaborative problem-solving within the family (Rice, 1999). According to Rice (1999), as one leaves the nuclear family, family support systems are inevitably disrupted for spouses or parents and children. Separation experiences like these can be especially significant when a family member joins the military. Family structure changes as parents are left behind when a child joins the military, or one parent is left to care for a child or children while their spouse is gone, or a single parent leaves a child in the care of another adult or adults (Rice, 1999). In single-parent families, parental absence can be especially unfavorable for both the parent and the child (Rice, 1999). Consequently, conflict between family and military duty contribute to increased stress levels (Bray et al., 2003). Both male and female military personnel identify separation from family members as one of their top three source of stress (Bray et al., 2003). In addition to separation from family, family's health problems or children's behavior problems also add to family-related stress (Bray et al., 2003).

Deployment. Deployment is, by definition, a relocation of military personnel, which encompasses leaving origin or home station to other U.S. locations or destinations overseas. It includes the positioning of forces into formation for battle, and this process can involve permanent station in overseas or within any U.S. locations after the deployment duty has ended. Deployment is generally described as highly stressful for

military personnel (Bray et al., 1999, 2003). Both U.S. military men and women report deployment and related separation issues as major sources of stress; with those deployed to Asia, reporting 1.5 times more stress due to being away from family than those at other installations (continental United States, Hawaii, and Europe) after controlling for demographic factors (Bray, Bae, Federman, & Wheeless, 2005). Moreover, military personnel with deployment experience exhibit a higher alcohol use rate than the non-deployed (Federman et al., 2000). For example, those stationed in Asia are more likely to become heavy drinkers than those stationed within the continental United States or Germany (Bray et al., 2005). Although there is limited information to explain this discrepancy in the amount of stress between the regions, stress from overseas deployment, in particular, is discussed in terms of disconnections from one's culture as well as family members, including support systems (Bray et al., 2003). Berg, Meegan, and Deviney (1998) claim "Individuals experience stressors within a social context, and cope with stressors in a collaborative fashion with other individuals" (p. 240). In a similar sense, loneliness and confusion are associated with higher quantity drinking (Neff, 1997) which can lead to relapse to heavy drinking in people who are disposed to alcohol use disorders (Foster, Marshall, & Peters, 1998). Therefore, whether or not individuals drink to fit in or drink as a result of stress from isolation or deployment, stress due to separation from family and one's own culture may contribute to increased drinking. Therefore, along with the level of stress stemming from military work conditions, social isolation or lack of social support is also important in understanding the drinking patterns of young military personnel who experience overseas deployment.

Drinking Motives and Positive Alcohol Expectancies

Motivations or reasons for alcohol use are referred to as a "pathway" to alcohol use (Cox & Klinger, 1988; Harris & Fennel, 1988; Copper, Frone, Russell, & Mudar, 1995). In other words, people choose to drink in attempts to regulate positive and negative emotions such as tension, anxiety, and other stress-induced negative emotions; hence, such expectations function as drinking motives and antecedents to alcohol consumption (O'Hare, 1990; Cooper et al., 1995; Tran, Haaga, & Chambless, 1997). Previous findings suggest that drinking motives play an important role in alcohol consumption and alcohol-related problems among adolescents and college students (Cooper, 1994; Cooper et al., 1995; Read, Wood, Kahler, & Maddock, 2003). The concept of drinking motives also parallels that of alcohol expectancies as drinking motives refers to individuals' perceived need fulfillment through drinking. Similar to drinking that is motivated by the expectations of positive results such as improved mood, high positive expectations can also trigger alcohol relapse in recovering alcoholics (Brown, 1985; Cooper et al., 1995).

Pearlin et al. (1981) discuss a life stress paradigm composed of three main conceptual domains: (1) sources of stress, (2) mediators and/or moderators of stress, and (3) outcomes of stress. According to the paradigm, it is not stress that directly prompts people to drink; rather, drinking is facilitated by the benefits people anticipate from drinking or their beliefs regarding alcohol's efficacy in relieving stress (Harris & Fennell, 1988; Copper et al., 1995). This relationship is referred to as the mediating role of psychological factors between stress and drinking. For example, Cooper and his colleagues (1995) tested a multivariate model of alcohol use, and suggested that drinking

motives or expectancies are important predictors of alcohol use and abuse. Similarly, Harris and Fennell (1998) examined the mediating effect of drinking beliefs between job stress and alcohol use using a sample of 261 employees from two white-collar corporate firms. Their findings suggest that people who believe in the efficacy of alcohol (to relieve stress) tend to consume greater quantities than those who do not believe that alcohol helps them deal with job stress. The outcomes also imply that workers' beliefs or expectations about alcohol can be related to their individual perceptions of work load, i.e., work stress. Therefore, drinking motives are proximal to the concept of decisions to use alcohol.

Positive alcohol expectancies or negative mood regulation expectancies, in particular, are considered a learned behavior involving a cognitive process loop that reinforces individuals' beliefs that alcohol will relieve tension and provide a sense of relaxation (Abrams & Niaura, 1987). Many people develop these expectancies in early childhood as they explore alcohol (McNeece & DiNitto, 2005). Like the general population that favorably remembers the emotional relief from drinking, young adults also tend to believe that drinking will give positive or pleasurable experiences (Brown, 1985; Mooney et al., 1987; Cooper et al., 1995; Smith et al., 1995). For example, Goldberg et al. (2002) suggested that after controlling for age, having consumed alcohol impacted youth's perceptions of the benefits of drinking, which supports the notion that positive alcohol expectancy is a learned behavior as youth explore alcohol use. In addition, perceived drinking benefits were found to predict drinking behaviors among fifth to ninth-graders rather than their alcohol-related perceptions of health risks, natural hazards, and motor vehicle accidents and injuries (Goldberg et al., 2002). Although

conducted on youths ages 12 to 14, this study gives insight into how people may view drinking as positive experience even at an early developmental stage. In fact, the more youth endorse positive alcohol expectancies, the higher their drinking level, and vice versa, which creates a positive feedback loop between the expectancy and drinking (Smith et al., 1995).

A similar study on college students' alcohol expectancies yielded comparable results (Brown, 1985). Cooper (1994) conducted a multi-group analysis using one adult and one adolescent group and showed that alcohol use is a result of an emotion management strategy, thus emphasizing the importance of psychological motives in alcohol use. In college samples, while students' affect regulation of negative emotional states such as anxiety or depression was an important motive for drinking (Ham & Hope, 2003), their drinking was also motivated by the desire to enhance sensation seeking and enjoyment (Ham & Hope, 2003) or to attain stimulation (Stewart & Devine, 2000). Some college students also drink to achieve social conformity or acceptance and approval from their peers (Farber, Khavari, & Douglas, 1980). These behaviors are also associated with increased alcohol use and alcohol-related problems (Cooper, 1994). Consequently, having high positive expectations of drinking is associated with a higher likelihood of drinking as well as experiencing alcohol problems (McCarty & Kaye, 1983). As a result of falsely perceiving the risks involved in drinking young people tend to minimize or neglect potential harms associated with risky behaviors (Leigh, 1999; Goldberg et al., 2002; Schulenberg & Maggs, 2002). In fact, heavy drinkers tend to perceive significantly less risks than lower level drinkers. Therefore, it is fair to include alcohol expectancies

and/or drinking motives as mediators between stress and alcohol use as well as alcohol-related consequences in the model to be tested in this study.

Stress Coping

Coping can be defined as managing stressful life conditions (Lazarus, 1999). According to Lazarus and Folkman's (1984) stress-coping theory, people under stress first appraise the severity of the consequences of a stressor and then assess available resources and possible coping strategies. Stress coping is a secondary assessment and strategies in which individuals engage in behavioral and psychological processes to minimize the amount of internal distress caused by stressful events (Folkman et al., 1986). While drinking motives are related to emotional reasons for drinking as well as positive expectancies associated with drinking events, coping is "individuals' constantly changing cognitive and behavioral efforts to manage stressors" which can include various negative behaviors such as drinking (Lazarus & Folkman, 1984). Therefore, coping is different from drinking motives because coping, especially avoidant coping, functions as a moderating factor between stress and alcohol use (Cooper, Russell, Skinner, Frone, & Mudar, 1992) while drinking motives are suggested to mediate relationships between stress factors and alcohol use (Harris & Fennell, 1988; Cooper et al., 1995).

The cognitive processes people use as they perceive and react to stress differ; therefore, they react to stressors differently (Rice, 1999). Besides, given that coping can moderate the relationship between stress and alcohol use, it is more reasonable to suggest that elevated stress levels and increased drinking may be a result of individuals' inability to cope effectively and healthily (Brown et al., 1995; McEwan & Sapolsky, 1995; Rice, 1999; Stewart, 2000). This implies that drinking is an outcome of high stress levels

moderated by one's coping styles. Thus, depending on the kind of coping strategies one chooses, stress coping may result in different health outcomes (Heaney, Price, & Rafferty, 1995; Rice, 1999).

Coping has been measured or categorized into a few different types and subcategories. For example, the Coping Inventory of Stressful Situations (CISS) scale identifies three different coping styles (i.e., task-oriented, emotion-oriented, and avoidance) of which the avoidance strategy is subdivided into 'social diversion' and 'distraction.' Problem-solving strategies entail individuals' efforts to recognize, modify, or remove the impact of a stressor; while emotion-focused coping strategies are mainly efforts to regulate negative emotional consequences in reaction to a stressful. Generally speaking, people use both problem-solving and emotion-focused strategies to deal with stress; therefore, both aspects of coping should be assessed in explaining alcohol use patterns. Additionally, the degree to which each coping type is used differs by personal style and by the types of stressful events they experience (Folkman & Lazarus, 1985; Folkman, et al., 1986). For example, people tend to predominantly use problem-focused coping strategies when they perceive stress conditions to be within their control. Negative emotions, however, can occur if individuals' choices of stress management methods are not successful (Lazarus & Folkman, 1984). Avoidance strategies are often used in combination with problem-and emotion-focused strategies. However, some people simply choose avoidance strategies, such as cigarette, alcoholic, marijuana, or other illegal drug use, or attempts to hurt oneself or others; these strategies are of much concern because they are also linked to involvement in other risky health behaviors (Johnsen, Laberg, & Eid, 1998). Inconsistencies are expected in the effects of avoidance coping

strategies, particularly alcohol use, since these effects or outcomes may depend on individuals' particular circumstances as well as how much they use (Lazarus, 1993; Tennen, Affleck, Armeli, & Garney, 2000). For example, drinking as an avoidant coping strategy can be both adaptive and maladaptive to the stressful situation. Drinking may sometimes help individuals deal with negative affects in the short run, although increased alcohol use can also induce more negative affects as well as greater alcohol consumption. Therefore, coping strategies, especially avoidant strategies, are commonly discussed within the context of events and individuals' selection of coping methods (Park, Armeli, & Tennen, 2004).

Another way to distinguish different types of coping strategies is to divide coping mechanisms into positive and negative categories which the criteria for distinction is the outcome that is a result of choosing such coping behavior (Ruzek et al., 2007). Positive coping actions, by definition, are behaviors that help to reduce stress symptoms such as anxiety at the same time as they improve the stressful situation. Examples are talking to another person for support, getting adequate rest or exercise, and engaging in other positive distracting activities. Negative coping actions, on the other hand, may reduce distress immediately but are less effective in sustaining more permanent change that positive actions can bring. Drinking, isolation, unhealthy eating, smoking or substance use, or other self-destructive behaviors (e.g., harm to oneself and others) are examples of negative coping behaviors. Drinking is particularly known as one of many avoidant as well as negative coping strategies that may escalate and induce problems (Wood et al., 1992), such as impaired driving (Beck, Thombs, Mahoney, & Fingar, 1995). In the U.S. military population, although the majority of military personnel choose positive coping

strategies to relax, about one out of every four military personnel chooses drinking as a way of dealing with stress, and somewhat more male than female military personnel use alcohol as a coping method (26% vs. 21%) (Bray et al., 2003). Additionally, about 42 percent of military personnel report eating as a way of dealing with stress and/or depressive symptoms, followed by smoking (28%), considering hurting or killing themselves (5%), and using illegal substances (2%) (Bray et al., 2003).

Personality Traits: Risk-Taking and Impulsivity

Besides stress factors that influence alcohol use, it is also important to understand young adults' drinking behaviors from a developmental perspective that distinguishes them from other age groups in the populations. A number of predisposing factors are associated with increased drinking in young adulthood. Particularly, personality traits such as risk-taking and impulsivity are widely discussed in the literature on youth's alcohol use (Beck et al., 1995; Baer, 2002; Simons, 2003; Carey, & Hager, 2004). For example, it is suggested that impulsivity is significantly related to increased alcohol consumption and heavy drinking and its related problems among youth, including college students (Beck et al., 1995; Baer, 2002; Simons, 2003; Simons, Carey, & Hager, 2004). These personality factors have not received extensive study specifically with the military population; however, it is reported that military personnel classified as high risk-takers are more likely to engage in heavy drinking than low risk-takers (38% vs. 8%) and drunk driving (48% vs. 23%) (Bray et al., 2003). The 2005 DoD Survey of Health Related Behaviors Among Military Personnel data used the terms risk-taking and impulsivity interchangeably and operalizationalized the concept through a series of items including: (a) I often act on the spur of the moment without stopping to think; (b) I get a real kick

out of doing things that are a little dangerous; (c) You might say I act impulsively; (d) I like to test myself every now and then by doing something a little chancy; and (e) Many of my actions seem hasty. Based on this conceptualization, military personnel who were high risk-takers or highly impulsive were more likely to report heavy drinking (38% vs. 8%) and drunk driving (48% vs. 23%) than low risk takers or those who are less impulsive (Bray et al., 2003). Since impulsivity and risk-taking were interchangeably used in the DoD survey, the following sections discuss both impulsivity and risk-taking and their influence on alcohol use and alcohol-related consequences.

Impulsivity. Impulsivity has been defined in various ways. From a biological perspective, impulsiveness has been identified as a biological response pattern of seeking instant reward (Jentsch & Taylor, 1999). In a study of biopsychosocial aspects of impulsivity and psychiatric problems, impulsivity was defined as "a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions to the impulsive individuals or to others" (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001, p. 1784). Similarly, Chapman et al. (1984) define impulsivity as "habitual acting on impulse, difficulty in delaying any sort of gratification, lack of consideration for the consequences of behavior, and episodes of explosive, uncontrolled rage" (p. 683). Or in Little's (2000) terms, impulsivity is defined "an individual's tendency to make rapid behavioral changes regardless of detrimental consequences or the loss of a later reward of greater magnitude (e.g., taking a drug despite knowing the potential adverse effects on health or wealth" (p. 218). This is similar to alcohol expectancies in which drinkers focus on benefits rather than potential risks involved in drinking (Brown, 1985; Smith et al, 1995; Schulenburg & Maggs,

2002). Impulsivity is also one of the American Psychiatric Association's (2000) seven diagnostic behavior patterns of antisocial personality disorder. In fact, epidemiological studies on antisocial personality behaviors and alcohol use show that people who meet the criteria for antisocial personality disorder are more likely to engage in problematic drinking than those who do not (Schuckit, 1985).

Little (2000) emphasized the role of impulsivity on individuals' initial use, increased consumption, and even the development of alcohol dependence. Because young adults' brains, i.e., frontal cortex, are not fully developed, they are less likely to be capable of controlling behaviors such as impulsiveness. For example, among college students, impulsivity is suggested to be particularly associated with increased alcohol use after controlling for gender (Simons, 2003; Simons et al., 2004). Simons (2003) also examined and showed that impulsivity can have a significant impact on alcohol-related consequences among college students. Similarly, Waldeck and Miller (1997) used a 73-item Impulsivity/ Nonconformity scale developed by Chapman and Chapman (1985) to study gender and impulsivity differences in licit substance use among young college students. This scale had a test-retest reliability of .84 using a college student population (Chapman et al., 1984). Among 473 study participants, the top third in scores were called 'high impulsivity' and the bottom third as 'low impulsivity'; these groups were statistically different in terms of all licit substance use including alcohol, nicotine, and caffeine. Men in the higher impulsivity group used alcohol about twice as frequently as females in the higher impulsivity group (Waldeck, Miller, 1997). Bechara et al. (2001) also suggested that substance dependence, in particular, is associated with impaired decision-making due to individuals' inability to control impulses. Although heavy

drinking is different from dependence, as dependence requires more progressive symptoms of alcohol use (i.e., reported withdrawal symptoms, inability to recall things that happened while drinking, inability to stop drinking before becoming drunk, or morning drinking), studies on impulsivity and alcohol dependence can offer insight into negative consequences associated with impulsivities.

Risk-taking. Higher risk-taking attitudes are also reportedly to be related to greater alcohol consumption and negative drinking consequences (Benton, Benton, & Downey, 2006; Grucza et al., 2006; Lovallo et al., 2006). Benton et al. (2006) studied the effects of college students' risk-taking attitudes on alcohol consumption and negative consequences due to drinking. The Campus Alcohol Survey (CAS) was used to measure alcohol-related negative consequences including performing poorly on a test, receiving a lower grade, dropping a class, failing a class, damaging property, getting into a physical fight, having a vehicular accident, getting into trouble with authorities, requiring medical attention; getting hurt or injured, riding with others who had been drinking, and becoming unconscious as a result of their drinking. Based on their result, Benton et al. (2006) suggested that risk-taking propensity leads to alcohol use; hence, alcohol use is an outcome of attitudes toward risk-taking. Their findings are consistent with previous findings on gender disparities in terms of quantity of drinking and alcohol use pattern. Men were more likely to take risks and to experience more harm than women. Moreover, people who possess high risk-taking tendencies showed both greater involvement in heavy drinking and greater negative consequences due to drinking than their peers. Therefore, it seems fair to conclude that people who engage in risk-taking and impulsive behaviors are more likely to drink and experience alcohol-related consequences.

Enabling Factors

Alcohol Availability

Alcohol availability is particularly important to consider in understanding the drinking contexts of military personnel because people tend to assume drinking norms of their surrounding culture (Gruenewald & Millar, 1993; Ames & Grube, 1999; Frone, 1999). Alcohol availability theory posits that alcohol consumption rates and alcohol-related consequences are likely to increase as alcohol becomes socially and physically available. Ames and Grube (1999) introduced this availability paradigm to explain workplace drinking and suggest that subjective physical and subjective social availability are the keys to understanding how people develop beliefs about drinking. Objective physical availability differs from subjective physical availability in that "objective physical availability refers to actual legal access and barriers to obtaining alcohol, while subjective physical availability has to do with individuals' perceptions or beliefs about the ease or difficulty of obtaining alcohol" (p. 383). Similarly, objective social availability refers to "the actual drinking and approval of drinking by family, friends and others, while subjective social availability is an individual's perception of drinking norms in a given environment" (p. 384). The objective and subjective availabilities of alcohol in college drinking culture can comprise the context or culture of drinking (Bachman et al., 1997) as do external property variables including pricing and availability of alcohol outside campuses (Presley et al., 2002). Subjective social availability can also be understood as a peer influencing factor because one's attitudes and beliefs about drinking in young adulthood are likely to be influenced by the norms of their peers (Andrews et al., 2002). Therefore, it is fair to conclude that individuals' perceptions of the atmosphere

or drinking norms are important in developing one's perception about the availability of alcohol and acceptance of drinking (Ames & Grube, 1999).

Military Culture, Drinking Norms, and Policy

The effect of military policy, culture, and drinking norms on young adults drinking can be also analyzed from the alcohol availability stand point. Many cultures view drinking in young adulthood as a step in becoming an adult or as a mark of manhood as well as a part of leisure activities (Houghton & Roche, 2001). In addition, drinking is a learned behavior and is often integrated in various ways within the lifestyles of people of each racial/ethnic groups or and culture, and this interacts with personal or environmental factors that facilitate how individuals shape their beliefs about drinking (McNeece & DiNitto, 2005). Therefore, certain characteristics of the military culture can factor into alcohol use and heavy drinking at a significant life stage of young people (Ames & Cunradi, 2004). Those include unique characteristics of the military workplace culture, such as ritualized drinking opportunities (e.g., "the work environment that encourages drinking at work on land bases and during deployment liberties" or "sailors viewing drinking with coworkers during the work week as an appropriate coping mechanism in response to stress, boredom, loneliness, and lack of other recreational activities") (p. 254), as an important environmental factor (Ames & Cunradi, 2004). Other significant risk factors, such as inconsistent alcohol policies (e.g., the minimum drinking age varies according to country of deployment), are also suggested to influence individuals' beliefs about drinking context and behaviors (Ames & Cunradi, 2004). Knowing that young military personnel are at high risk for alcohol use and heavy

drinking as well as the mental, emotional, and physical challenges associated with the nature of their work, they are a population that requires special attention.

When young adults join the military, their values are likely to be influenced by a new set of military cultural values and beliefs including those about drinking (Ames & Cunradi, 2004). Their views on military culture and drinking norms are reflected in the Department of Defense survey series. When asked about their perceptions of the drinking culture in the military, more than 70 percent of military survey respondents, regardless of region, agreed that most of their military friends drink, and they experienced some pressure to drink in order to fit into the culture (Bray et al., 2005). The survey contained a series of questions or statements that intended to capture their perceptions of military drinking norms and culture. Such statements included "It's hard to fit in at this installation if you don't drink," "Most of my friends drink," "Drinking is part of being in the military," and "At parties or social functions at this installation, everyone is encouraged to drink." Moreover, approximately 36 percent of military personnel of all ages drank more after joining the military, while about 33 percent of them either decreased their drinking or became abstainers (Bray et al., 2005).

Inconsistencies in military regulations on drinking may also influence how young military personnel perceive both objective and subjective availability of alcohol and may contribute to the development of young military personnel's perception of military culture as ambivalent toward drinking (Gruenewald & Millar, 1993; Ames & Grube, 1999; Frone, 1999). The official military policy is zero tolerance toward underage drinking and toward problematic drinking behaviors among all personnel. However, military regulations on minimum drinking age differ by locations within the United States

and across host countries outside the United States. The current military policy on alcohol use is flexible as legal drinking depends on the region of installation, commander's determination, and types of activities. The military law DoD Instruction 1015.10, "Programs for Military Morale, Welfare, and Recreation (MWR)" codifies the minimum drinking age for both installations located in the United States as well as installations located outside the United States. The minimum drinking age is defined as "the minimum age established for persons who may purchase, possess, or consume alcoholic beverages." The military's minimum drinking age policy, first established in mid-1980s, states that installations located within the United States is to observe the age established by the law of that State (USC 10, Section 2683). There is exception to this rule: if the base is located within 50 miles of Canada or Mexico, or a state with a lower drinking age, the installation commander may adopt the lower drinking age for military personnel on base. Since the commander is not mandated to abide by the law, some installations that are within 50 miles of a border with a lower drinking age have allowed drinking at as early as age of 18. For example, Ft. Bliss, located in Texas but within 50 miles of Mexico, a country whose minimum drinking age is lower than the federal law, the minimum drinking age was 18. However, due to great concerns about safety and increasing alcohol-related incidents, the Ft. Bliss commanding general raised the minimum drinking age from 18 to 21 in 2008. As a result, young soldiers under age of 21 at Ft. Bliss are no longer allowed to purchase or drink alcohol.

The minimum drinking age for installations located outside the United States is also age 18. Similar to flexibilities in minimum drinking age regulations at installations in the Unites States, the commanders of installations outside the United States have the

authority to apply a minimum drinking age higher than age 18 based on international treaties and agreement with the region of installation and on the local situation. They may also waive such requirements under justifiable special circumstances, such as infrequent, non-routine, military occasions as a group, on the condition that the commander exercises appropriate control to ensure the safety of his or her military personnel.

There have been other recent changes in the military regulation on minimum drinking age. For instance, in 1997, the Marine Commandant issued a policy which states that Marines must be at least age 21 to drink regardless of any lower drinking age law in the host-country. To list a few foreign legal drinking ages, Germany is age 16 for beer and wine, and age 18 for spirits; South Korea is age 19; and Japan is age 20. In September 2006, the U.S. Marine Corps, however, lowered its minimum drinking age for Marines in Japan from age 21 to 20 to reflect the local drinking age. In April 2007, the Marine Corps again modified the regulation by lowering the minimum drinking age to 18 in foreign posts if allowed by the host country.

Such discrepancies in the minimum drinking age may contribute to regional differences in heavy alcohol use between overseas installations and the continental United States. For example, young adults stationed overseas, such as Germany or Asian countries, are more likely to become heavy drinkers than those stationed in the continental United States (Gruenewald & Millar, 1993; Ames & Grube, 1999; Frone, 1999). Military personnel stationed in Asia are even more likely to become heavy drinkers than those stationed in Germany (Bray et al., 2005). Therefore, even if the minimum drinking age regulation is more generous to military personnel in foreign countries, it alone does not explain regional differences. Bray et al. (2005) attribute to

this difference to the distinct demographic differences of military personnel sent to Asia versus other regions, not necessarily the culture of the installation itself. For example, military personnel in Asia are more likely to be young single males with lower education (Bray et al., 2005), which is consistent with the sociodemographic characteristics of heavy alcohol users in the general U.S. population as well as in the military. Bray et al. (2005) also suggest that other factors such as the host country's drinking culture may impact young adults' drinking attitudes (Bray et al., 2005). Thus, Bray et al. (2005) introduced the idea of differing perspectives on alcohol use of the host country that could impact drinking behaviors of U.S. military personnel in addition to the military culture that reinforces "work hard, play hard" and cheap alcohol beverages that provide easy access to alcohol to young people.

Although region alone does not explain differences in alcohol use patterns of military personnel, heavy drinking is consistent with the minimum drinking age: personnel installed in the Unites States (where the minimum drinking age is 21) are less likely to become heavy drinkers compared to military personnel stationed at U.S. military bases located within 50 miles of Canada or Mexico, a state with a lower drinking age, or overseas installations.

To summarize, young people who join the military are exposed to the military system at a very important developmental stage with inevitable life transitions; thus, their personal drinking paradigm is likely to be influenced by the military as they take on the beliefs and norms of the military as well as their peers. Important in understanding young adults' drinking in the military is the context or drinking environments of the military,

including both objective and subjective availability, especially factors that encourage risky as well as a mature and sensible drinking.

Reinforcing Factors

Peer Influences and Social Networking

Peer and social influences play a significant role in shaping young adults' perceptions of alcohol consumption (Andrews et al., 2002) regardless of their ethnicity (McNeece & DiNitto, 2005). As Arnett (2006) mentioned, young adults or "emerging adults" are still in the process of clarifying their roles, values, and discovering their identity as well as learning self-control (Arnett, 2006). Compared to older adults who are more likely to have established stability and greater ability to control their impulsiveness, young people tend to seek risks and are more easily affected by peer influences (Houghton & Roche, 2001). For example, in a review of studies on college students' social norms on alcohol use, peer norms on drinking were identified as the strongest predictor of students' drinking behaviors (Perkins, 2002). In fact, the more socially integrated, the more heavily they drank (Perkins, 2002). Moreover, many college students drink more not only because they perceive campus attitudes towards drinking to be permissive, but they also tend to misjudge their peer's drinking behaviors (Borsari & Carey, 2001). Besides studies that suggest that peers' social norms play a critical role in changes in drinking behaviors, others also argue that individuals selectively choose "buddies" who may have drinking habits similar to their own (Carter et al., 2001). Therefore, whether college students or military personnel, young adults tend to drink to establish connections or belong to a group (Ames & Cunradi, 2004; Bray et al., 2005). In other words, individuals create a social network with peers who mimic their own drinking

patterns. Therefore, Bullers et al. (2001) suggest that it is not only social influences that change or reinforce drinking patterns among adults; social selection also affects this dynamic.

NEGATIVE DRINKING-RELATED CONSEQUENCES

Drinking alcohol can involve risky behaviors associated with various negative consequences. Such costs entail an inability to maintain a healthy lifestyle and interferences with family and interpersonal relationships. Immediate health risks due to excessive alcohol use (i.e., heavy drinking, binge drinking, or both) include unintentional injuries such as traffic accidents or falls, intimate partner violence, child maltreatment, risky sexual behaviors, unintended pregnancies, sexually transmitted diseases (STD), drinking and driving, miscarriage, and alcohol poisoning (Saton et al., 1999; Centers for Disease Control, 2005). Continued excessive drinking can lead to more chronic health conditions, neurological impairments, psychological problems such as depression and suicidality, and social problems such as unemployment, loss of productivity, and family or interpersonal problems (Centers for Disease Control, 2005). Heavy alcohol use may also suggest increased displacement of aggression (Aviles, Earleywine, Pollock, Stratton, & Miller, 2005) and impair cognitive processes (Abbey, Saenz, & Buck, 2005). Particularly for young adults, alcohol use is one of the strongest predictors of suicide and homicide (Center for Disease Control, 2005).

A substantial number of young adults in the military experience negative consequences from drinking. For example, more than one-sixth (17 %) of active duty military personnel experienced productivity loss due to alcohol use (Bray et al., 2003). Military personnel who use alcohol heavily compared to those who do not drink were

more likely to report stress at work (40% vs. 30%) or family trouble (22% vs. 16%), exhibit anxiety symptoms (21% vs. 17%) and depressive symptoms (26% vs. 18%), and report more limitations in activities due to poor mental health (6% vs. 3%) (Bray et al., 2003). In addition, heavy drinkers compared to light drinkers are more likely to report increased tardiness at work, leaving early, low performance, and on-the job injury (Bray et al., 2003), and lower combat readiness (Bray et al., 1999). It bears repeating that these drinking prevalence rates among military personnel may underestimate the true figures because survey participants tend to underreport their alcohol consumption and adverse effects due to fear of negative consequences to their service status (Bray et al., 2003). Bray et al. (2003) also caution that the direction of the relationship between stress and poor job performance cannot be specified because it is likely that stress can result in lowered productivity and that lowered productivity can also cause individuals to experience more stress.

MULITVARIATE MODELS ON ALCOHOL USE

Numerous studies have incorporated various factors such as sociodemographic, developmental, and psychological predictor variables in understanding the drinking patterns of young adults. This section presents examples of multivariate models from the alcohol research literature on the relationships between diverse predictor variables that are known to significantly influence alcohol use and alcohol-related consequences. Alcohol use patterns can be examined and understood from various research interest points of view; therefore, the followings focus more specifically on some of the factors (e.g., independent, mediating, and moderating factors) that were discussed previously in this chapter and incorporated in the proposed SEM. Six models were extracted directly

from relevant studies and presented here to facilitate a structural understanding of the development of the conceptual model for the current study (Figure 1) presented in greater detail in Chapter III.

Figure 2. Consequences of Binge Drinking: Risk and Protective Factors (Dhuse, 2005)

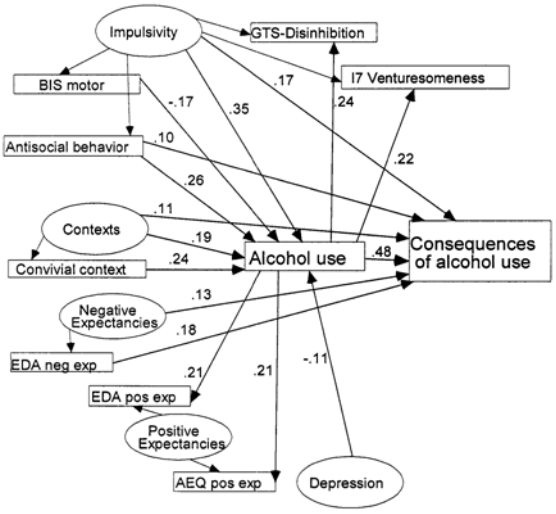
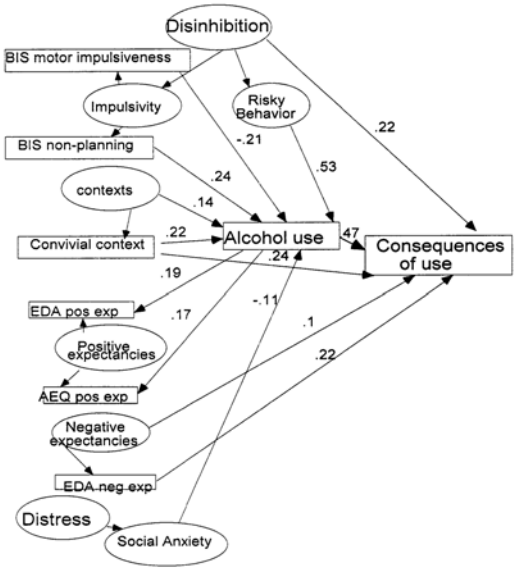


Figure 3. Consequences of Binge Drinking: Risk and Protective Factors (Dhuse, 2005)



First, Figures 2 and 3 show Dhuse's (2005) two multivariate models of risk and protective factors of binge drinking and consequences of alcohol use. Dhuse's initial conceptual model prior to evaluating the model fit as well as paths incorporated various risk and protective factors including family history, antisocial behavior, impulsivity, disinhibition, positive and negative alcohol expectancies, willingness to drink in a variety of contexts, and depression. After the SEM analysis using data collected from 373 college students, Dhuse (2005) presented two figures that contain only statistically significant predictors (alpha set at the .05) and paths of alcohol use and alcohol-related consequences. Include factors are impulsivity, alcohol expectancies, depression, and anxiety. One of the important results of this research is the consistent findings of the effect of young adults' impulsivity on alcohol use and alcohol-related consequences as discussed previously. In addition, the results also support the notion that positive alcohol expectancies are learned behaviors through alcohol consumption.

Simons (2003) conducted a similar SEM analysis with 231 college students to determine the role of biopsychological and social-environmental variables in predicting alcohol use and alcohol-related problems (Figure 4). Alcohol use was assessed by two manifest variables, lifetime alcohol use and frequency of drinking within past 30days at the time of survey. Alcohol-related consequences were measured by Rutger's Alcohol Problem Index (RAPI) which consists of 23 question items related to problems with alcohol use. Although Simons hypothesized that impulsivity directly affects alcohol use and alcohol-related problems, the findings did not show a significant relationship between impulsivity and alcohol use among young adults; however, impulsivity had a significant effect on problems with alcohol use. This is consistent with Dhuse's (2005)

findings that suggest that impulsivity has an effect on alcohol-related consequences among young adults.

Figure 4. Differential Prediction of Alcohol Use and Problems: The Role of Biopsychological and Social-Environmental Variables (Simons, 2003)

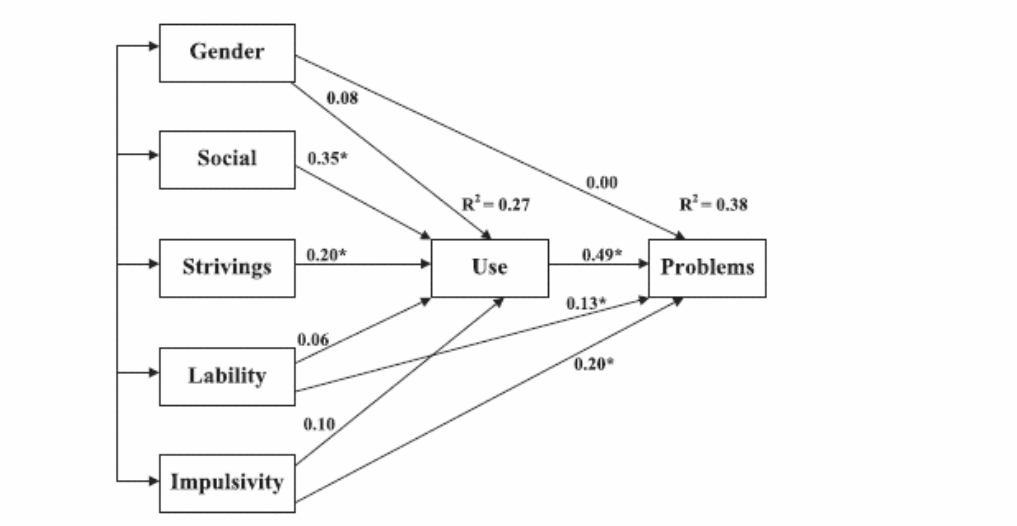


Figure 5. Stress, Alcohol Use and Alcohol-Related Problems: The Influence of Negative and Positive Affect in Two Cohorts of Young Adults (McCreary & Sadava, 2000)

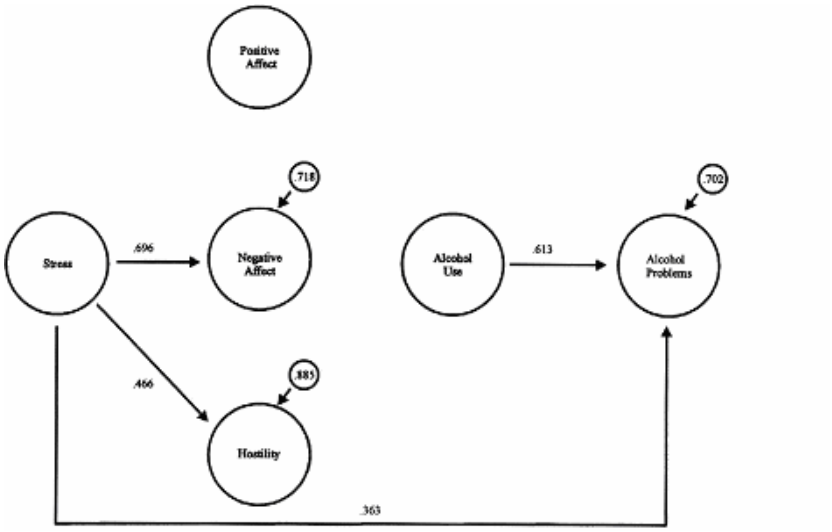
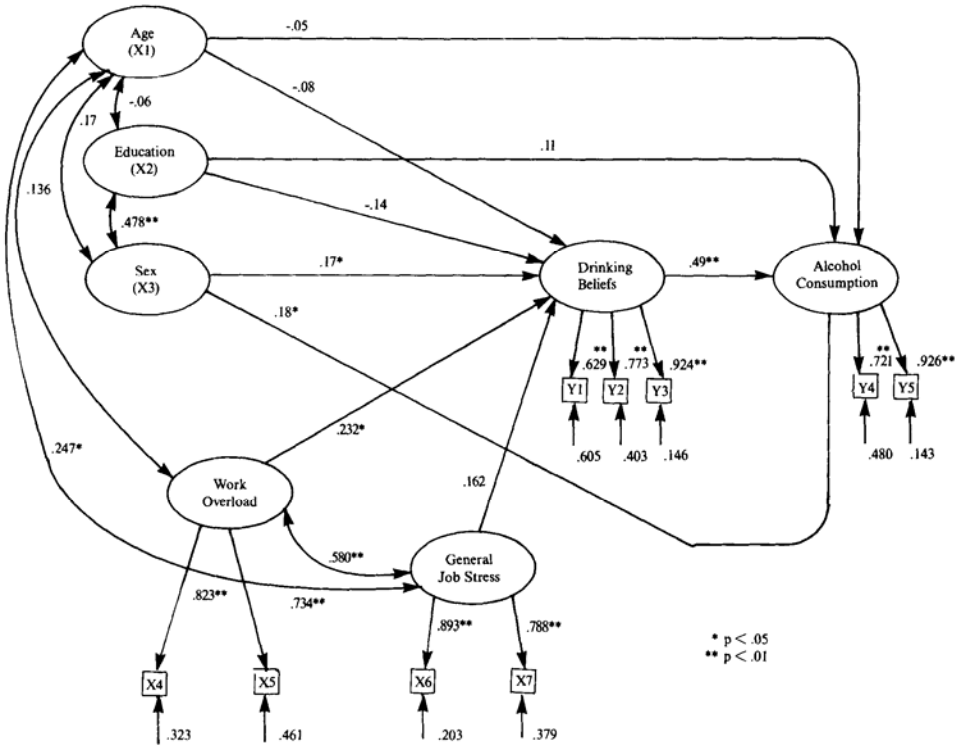


Figure 5 shows a structural equation model of young adults' alcohol use and alcohol-related problems particularly initiated by stress and three types of affects (McCreary & Sadava, 2000). Stress was measured by questionnaires used to assess perceived stress, daily hassles, and negative life events rather than a specific type of stress (e.g., family or work-related stress). For example, Harris and Fennell (1988) focused primarily on occupation stress. The model (Figure 4) presented above shows only statistically significant (alpha set at the .01) paths with arrows and path coefficients between the variables. The model was tested using two cohorts (a younger cohort with a mean age of 22, and an older cohort with a mean age of 31). Findings on the younger cohort will be the main focus in this section as young adults include in the current study are aged 18 to 25. McCreary and Sadava (2000) found that stress is more likely to be a direct predictor of alcohol-related problems than alcohol use. Therefore, they argue that stress itself is not a strong predictor of alcohol use and suggest examining factors that mediate the stress and alcohol use relationship.

Lastly, the final three models (Figure 6, 7, and 8) examined the mediating effects of drinking beliefs and drinking motives. Figure 6 is the multivariate model Harris and Fennell (1988) used to investigate the role of drinking beliefs (or the beliefs regarding the efficacy of alcohol to relieve stress) on the relationship between job stress and alcohol use. Although data were collected from 261 employees from two white-collar corporate firms, and the findings may not be directly applicable to young adults, their findings on the mediating effect of drinking beliefs between job stress and alcohol use is noteworthy. Based on their study's outcome, they concluded that individuals who believe that alcohol helps them deal with job stress will consume alcohol in greater quantities when faced

with job stress than employees who do not believe that alcohol helps them deal with job stress. Furthermore, they suggested that a worker's beliefs about alcohol are particularly related to perceptions of work overload which is analogous to the concept of work stress discussed in the literature review section in Chapter II (p. 35-37).

Figure 6. A Multivariate Model of Job Stress and Alcohol Consumption (Harris & Fennell, 1988)



Similarly, Cooper and his colleges (1995) developed a multivariate model of alcohol use (Figure 7 and 8) and tested whether or not drinking motives (e.g., "Drinking alcohol helps me forget worries;" "Drinking alcohol helps me cheer up when I'm in a bad mood") is a pathway to alcohol use and abuse (adolescents and adults were considered separately). Rather than a direct relationship between stress and alcohol use, Cooper et al.

(1995) and Harris and Fennell (1988) results indicate the importance of mediating factors such as drinking beliefs or motives in examining alcohol use patterns.

Figure 7. Drinking to Regulate Positive and Negative Emotions: A Motivational Model of Alcohol Use (Cooper et al., 1995) (Adolescent Sample)

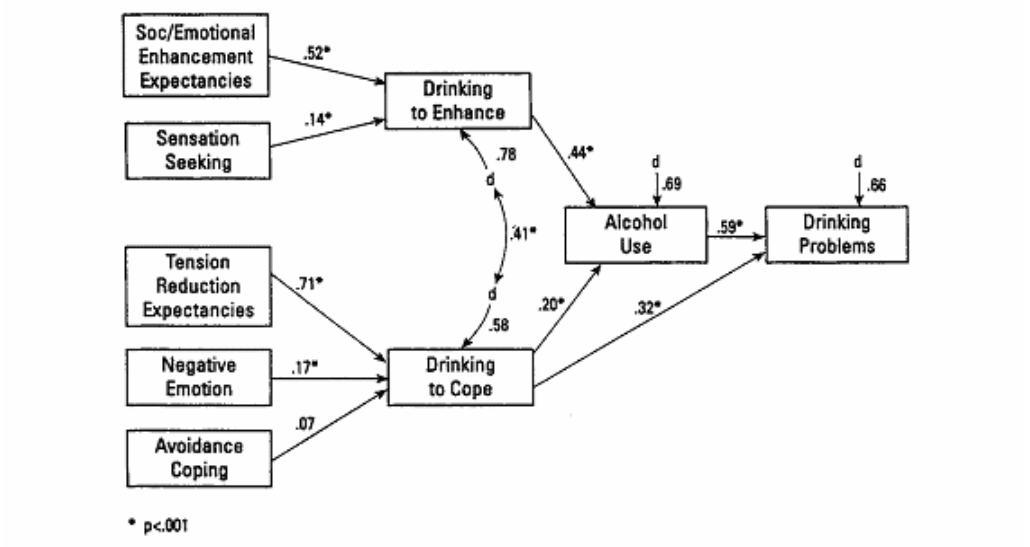
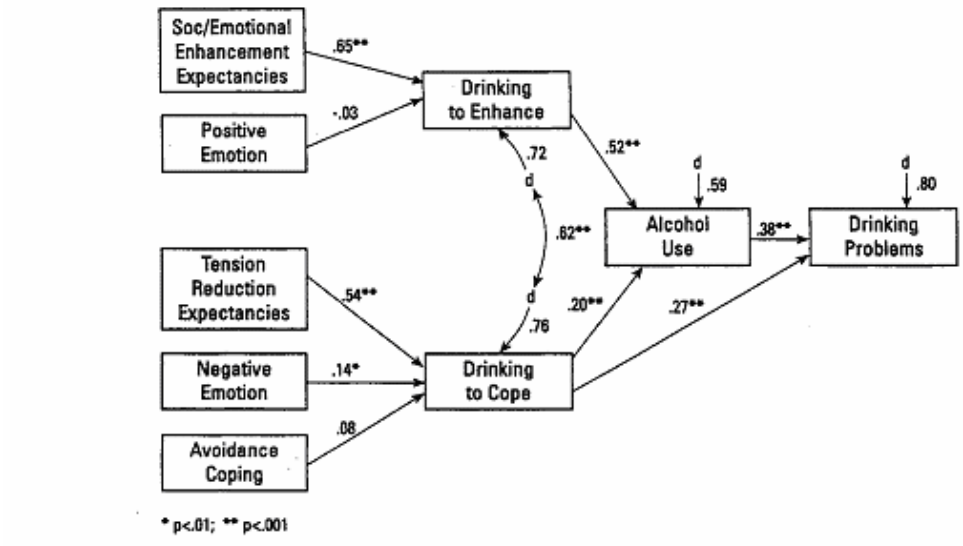


Figure 8. Drinking to Regulate Positive and Negative Emotions: A Motivational Model of Alcohol Use (Cooper et al., 1995) (Adult Sample)



ARE RISK-TAKERS SELECTIVELY CHOSEN?

Given the relationship between impulsivity and/or risk-taking and alcohol use, it may be worth exploring if the U.S. military could in fact be recruiting high risk-takers or highly impulsive young people. Though the military system may not actively recruit young adults who are excessive risk-takers, its vision statement for the recruitment process could possibly attract individuals who are risk-takers. For example, the vision statement for senior executives include,

> "The Secretary of the Army and Chief of Staff's vision for the 21st century Pentathlete civilian calls for strategic and creative thinkers and accomplished professionals who are effective in managing leading and changing large organizations. These civilian leaders must be confident, competent decision makers, prudent risk takers, effective communicators, innovative adaptive, professionally educated, and dedicated to lifelong learning."

The irony is that through the military system seeks civilians who are prudent risk-takers as well as creative and strategic thinkers to accomplish their jobs, their vision statement may also attract people who are just risk-takers. Since the vision statement applies to civilians who are at high rank status or their equivalent (e.g., GS 14 or 15) it might be less applicable to young recruits. However, if the military system seeks leaders whose qualities include risk-taking, such leadership may influence young military personnel who perform under their commands.

One of the seven core values of the U.S. military is the encouragement for young military personnel to face fear, danger or adversity (physical or moral). There are action-packed situations where military personnel are exposed and expected to perform duties in extremely risky and hazardous circumstances. For example, Special Forces such as the

Army Green Berets are the ones who carry out one of the toughest military missions of the military. Their special missions include counterterrorism, various direct actions (e.g., seize, capture, recover or destroy enemy weapons and information), foreign internal defense, and special reconnaissance (e.g., intelligence-gathering activities on the enemy's movement and operations). They should have strong mental and physical capability to undergo difficult training; however, people who join the Special Forces must be a U.S. citizen male aged between 20 and 30 with at least a high school diploma. These positions are not open to women. In addition, because their missions contain high-risk situations (e.g., war), the Green Berets are required to take Survival Evasion, Resistance, and Escape (SERE) training to become a Special Forces Soldier. Since risk-taking is reported to be associated with negative health behaviors such as drinking, the Special Forces of the military, for example, may also attract people with substantial potential to engage in heavy drinking.

Referring back to young adults' developmental stages, young people are still in the process of establishing identities through various risk and sensation-seeking behaviors (Arnett, 2000). Therefore, it is possible that the military attracts young adults who are more likely to take risks or act upon impulsivity. Whether or not it is the risk-taking leadership practice that impacts young military personnel's behaviors or the nature of military duties that appeal to young people, a major concern is the impulsive personality traits of young people that are associated with irresponsible and/or heavy drinking.

WILL YOUNG ADULTS "MATURE OUT" OF PROBLEM DRINKING?

Generally speaking, it seems plausible to say that heavy drinking is a concern for many young adults in their early twenties regardless of their college status (O'Malley & Johnston, 2002). Though alcohol use prevalence is reportedly greatest among college students and young military personnel, some studies indicate that quantity and frequency of drinking and alcohol-related problems are similar for college and non-college groups (Jackson, Sher & Park, 2005; White, Labouvie, & Papadaratsakis, 2005). O'Malley and Johnston (2002) suggest that the differences between the groups are that college students may drink less frequently than non-college peers, but when college students drink, they tend to binge drink more than non-students, supporting the proposition that college living conditions and background characteristics may have considerable impact on drinking behaviors (Bachman et al., 1997; Presley et al., 2002). Some studies suggest that most high-risk college drinkers reduce their drinking after leaving college (White et al., 2005) or "mature out" of problem drinking (O'Malley, 2005; Jackson, Sher, Gotham, & Wood, 2001). Others, however, suggest that college students who drink problematically are likely to continue to do so in later years, leading to alcoholism or medical problems associated with chronic alcohol use (Schulenberg, O'Malley, Bachman, Wadsworth & Johnston, 1996). Young military personnel share similar demographic factors as well as living conditions of college students; therefore, some young military personnel may also "mature out" of the problematic drinking behaviors. However, due to the nature of the military job duties that entail extremely stressful conditions, drinking problem may persist into adulthood for those who remain in the military.

SUMMARY

Despite knowledge that drinking is associated with various negative consequences including health and behavioral problems as well as substantial productivity loss and poor job performance, young adults continue to drink and to a heavy level. The current literature provides a good deal of information on the prevalence of heavy alcohol use and indicators or key factors that may explain heavy drinking among young adults. Inferences can be made from alcohol studies on college students to young military personnel who share similar characteristics to full-time college students such as living arrangements with peers, exposure to alcohol, and cultures that encourage drinking. But young adult military personnel, particularly male and single service members, may also be exposed to even greater risks for heavy alcohol consumption than civilians of the same age, such as adjustment processes from civilian to military life, deployment, and combat duty. In addition, young military personnel stationed in particular countries, such as in Asia, who are particularly likely to be single and in lower pay grades, are more likely to drink heavily than other military personnel. Young soldiers are exposed to even greater temptations for drinking when alcohol is readily available in their working and living environment.

Heavy drinking promotes unhealthy lifestyles and impairs military personnel from being ready to serve, particularly in preparation for war. Young adults in the U.S. military aged 18 to 25 experience heavy alcohol use at much higher rates than civilians of the same age. In addition, consistent with the literature on gender differences and alcohol use prevalence, considerably more males are heavy drinkers than their female counterparts in the military as well as the general population. Therefore, it is reasonable to conclude that

the young adult males in the U.S. military who are aged 18 to 25 are at extremely high risk for heavy alcohol use. Besides demographic factors that influence heavy alcohol use, developmental aspects of young adulthood, such as peer influences in addition to personal propensity for risk-taking (i.e., sensation-seeking, risk-taking, and impulsivity), provide evidence as to how young people become engaged in drinking behaviors. Certain stress factors also seem to have profound impacts on individuals' functioning, including increased alcohol consumption. They include stress related to work, family, interpersonal relations, and deployment. While individual factors such as interpersonal or family problems contribute to stress, social-contextual stressors such as deployment, making transitions, and adapting to military culture or job duties may also provoke higher stress levels. Therefore, it is necessary to examine the drinking patterns of young military personnel by including both military stress factors and personal traits in predicting alcohol use level and alcohol-related consequences.

Environmental factors also seem essential in understanding increased drinking activities such as being single and having new freedoms with less direct parental supervision. Acquiring new freedoms seem to be an important transitional factor associated with increased current and heavy drinking among young adults. Young adults are likely to experiment and take risks during the process of identify formation. Moreover, entering military service also seems to be a factor in predicting heavier drinking and changes in young adults' beliefs about drinking due to the uniqueness of the military culture and ready access to alcohol. At the same time, frequent deployments and physical separations from family seem to limit young military personnel's social support, which provide less constraint on behavior and may lead to isolation and consequent

engagement in heavier drinking. Given the myriad range of factors implicated, it seems impossible to examine drinking patterns of young military personnel from any single perspective.

When contrasted with the military's official zero tolerance policy, alcohol availability and social acceptance of drinking (e.g., minimum drinking age) in the military culture seems to present a paradox. In an environment where alcohol is easily accessible, physically and socially, young adults' alcohol-using behaviors and alcohol-related consequences can be exacerbated because the environment can reinforce the desire for sensation-seeking and risk-taking in hopes of intense experiences. Young adults may perceive the military environment as condoning heavy drinking. Consequently, the culture and drinking norms can have a significant impact on their identity formulation, value substitution, and developments and changes in beliefs about drinking, whether positive or negative. It may be too early to conclude that the previously discussed factors are primary elements that explain drinking patterns of young men in the U.S. military. Many theories and perspective have been offered to explain the initiation and persistence of drinking problems such as genetic or biological factors. Other factors and connections may also exist that could explain the high prevalence rate of alcohol use, including drinking behaviors in the military. Examining the complexities of military drinking from a multivariate point of view that considers drinking within the context of the military environment seems like a worthwhile endeavor. Furthermore, given the differences among men and women in alcohol use levels, stressors, and other factors, it may be important to incorporate a gender sensitive approach to understanding the problem.

Based on an extensive literature review, the current study selectively included stress, impulsivity traits, drinking motives as main factors in the proposed model that predict alcohol use and alcohol-related consequences of young adults. Although there may be temporary benefits that people may experience from drinking, the term “drinking” or “alcohol use” in this study refer specifically to negative behaviors as it negatively effect individuals’ job performance. This study also hypothesized the mediation model of drinking motives based on various studies that suggest significant cognitive processes that are involved in drinking behaviors. Given the importance of a variety of variables explored in alcohol research in understanding the complex nature of alcohol use among young adults, it is needless to say that there may be other factors that could contribute more to understanding the alcohol use pattern of young adults such as genetic or neurobiological factors that may explain young adults’ alcohol use patterns from a different perspective. However, due to pertinent issues particularly in terms of using secondary data set and that the major goal of this study was to understand young adults’ drinking behaviors from developmental and psychological aspect, factors included in the proposed model were based on the availability of the survey yet these factors are expected to facilitate the development of a model that depicts young adults’ alcohol use. The following chapters present the details of the proposed model, explanations on strategies and results of latent variable constructs, and results of SEM analyses.

CHAPTER III

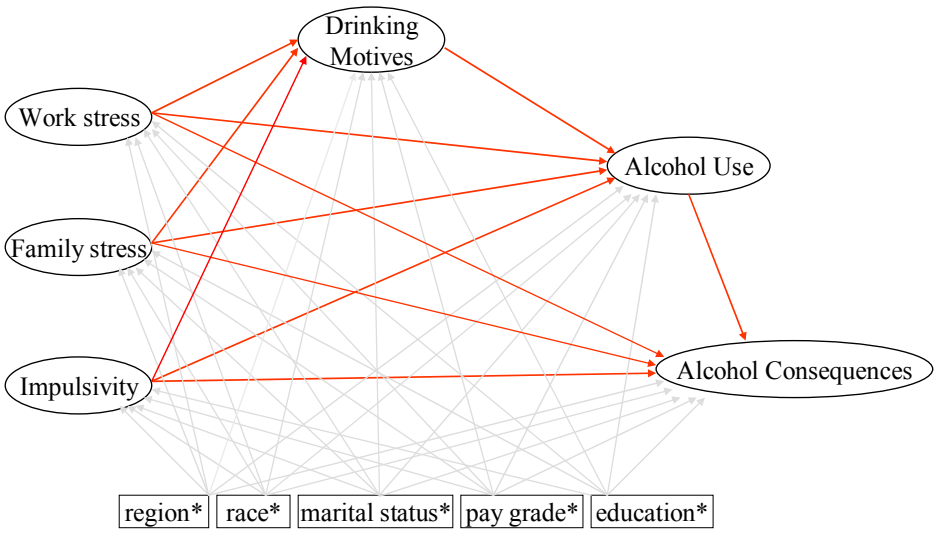
CONCEPTUAL FRAMEWORK

AMOS Model of Stress, Impulsivity, Drinking Motives, Alcohol Use and Alcohol-Related Consequences of Young Male Military Personnel

In Structural Equation Modeling (SEM), the model is the centerpiece of the study because the statistical analysis primarily functions as a key method to evaluating the usability of the proposed model. Figure 1 illustrates the proposed conceptual Analysis of Moment Structures (AMOS) model of hypothesized patterns of association between alcohol use and alcohol-related consequences and stress, drinking motives, and impulsivity in young male military personnel. It also shows the five demographic variables that are to be used as control variables. The current study takes on a confirmatory approach aimed at understanding alcohol use patterns from both developmental and psychological perspectives by making *a priori* assumptions about whether higher stress, greater positive expectations of drinking, and greater degree of impulsivity promote greater alcohol use, leading to lower job performance. There were two main reasons for choosing SEM for the analysis. One is the functionality aspect of SEM that allows examinations of complicated relationships with multiple latent variables constructed with various indicator items such as those proposed in this study (Figure 9). By doing so, the results constitute and verify the measurement aspect of the model (Kline, 1998). The other benefit of SEM is the ability to test any effects that a moderating variable may have on the proposed relationships between the latent variables. In this study, a moderating effect of coping was examined. AMOS (7.0) tests moderation effects

through a multiple group analysis function, therefore, the moderating effect it not directly shown in the model, but included as a moderator in the SEM multiple group analysis.

Figure 1. Structural Equation Modeling of Stress, Drinking Motives, and Impulsivity Motivated Alcohol Use and Alcohol-related Consequences of Young Male Military Personnel (*indicates control variables)



The model (Figure 1) was developed from an extensive literature review of factors that are suggested to influence young adults' drinking and alcohol-related consequences as well as a special consideration of gender and regional differences in drinking among military personnel. Key variables were included in the proposed model based on the extent to which items in the 2005 DoD Survey of Health Related Behaviors Among Military Personnel allowed the researcher to produce theoretically-based and meaningful latent constructs or indicators of the variables of interest. Items in the DOD data set allowed for stress, impulsivity, drinking motives, coping, alcohol use, and alcohol-related consequences (i.e., job performance) to be included, but indicator

variables were not present or sufficient to include other constructs or variables of interest, (e.g., genetic predisposition, sensation seeking).

Various multivariate models presented in the literature review (see chapter 2) provided a basis for model building in the current study in terms of the locations and functions of variables used to explain alcohol use patterns, but there are similarities and differences between the proposed model and the previous multivariate models that depicted alcohol use patterns. First, the proposed model conceptually links impulsivity with both alcohol use and alcohol-related consequences. It has been suggested that impulsivity is a significant predictor of increased alcohol consumption and heavy drinking and related problems among youth, including college students (Beck et al., 1995; Baer, 2002; Simons, 2003; Simons, Carey, & Hager, 2004). However, because there were some inconsistencies as to whether or not impulsivity significantly impacts alcohol use in the multivariate models previously tested (Simon, 2003; Dhuse, 2005), the current study was designed to test the possible effects of impulsivity on both alcohol use and related problems with young military personnel.

Second, this study tests a direct relationship between stress and alcohol use based on the tension reduction theory. It also considers the life stress paradigm in which significant cognitive processes, i.e., drinking motives or positive alcohol expectancies, are suggested to affect the relationships between stress and alcohol use (Pearlin et al., 1981; Cooper et al., 1995; Tran et al., 1997; Read et al., 2003). Combining the two theories thus leads to a model in which drinking motives partially mediate the relationship between stress and alcohol use. It is unclear whether McCreary and Sadava (2000), Harris and Fennell (1988), and Cooper et al. (1995) used a bootstrapping method

to examine the mediating effects of drinking motives or aimed to verify a partial or full mediation. In constructing the mediating variable drinking motives, the construct used in this study is similar to that of Harris and Fennell's (1988) in that the current study also used one latent construct that was measured by two indicators variables (drinking to forget about problems and to enhance mood). The two indicators are close approximations of the manifest variables used in Cooper et al.'s (1995) study, although they used each indicator separately as an independent mediator and predictor of alcohol use and its related consequences. Third, another key aspect of the model not included in these other studies is the examination of whether or not impulsivity is partially associated with alcohol use via drinking motives.

Fourth, the proposed model was also developed based on the Ecological Model of Alcoholism (Gruenewald & Millar, 1993) for its holistic approach which emphasizes the multiplicity of interactions between the person and the biological, physical, and social environment (e.g., stress or availability of alcohol) that interact with the host (i.e., demographic characteristics of the individual such as age, education, race, gender, occupation, and marital status) that interact to affect the development of alcoholism. Lastly, the model was constructed based on the life stress paradigm (Pearlin et al., 1981) that delineates the process or impact of stress via three main domains: (1) sources of stress, (2) mediators of stress and/or moderators of stress, and (3) outcomes of stress. Therefore, three major assumptions are highlighted in this model while controlling for service region, race/ethnicity, marital status, pay grade, and education level: (1) young adults' stress and impulsivity are associated with alcohol use mediated by the influences of individuals' drinking motives (or alcohol expectancies); (2) the overall alcohol use

pattern differs depending on individuals' stress coping; and finally, (3) job performance is significantly affected by alcohol use. As shown in Figure 1, the final model consists of six main latent constructs that are expected to provide increased accuracy in understanding alcohol use patterns of young adults in the U.S. military.

Since the literature suggests that high stress levels and alcohol use are both associated with lower job performance and productivity loss, alcohol-related consequences were measured by indicators of job-related consequences due to drinking. Region (service region) was controlled by including it as one of five control variable because it is reported that differences in alcohol use rates are affected by whether or not military personnel are stationed or deployed overseas or within the United States. Race/ethnicity, education level, marital status, and pay grade were also controlled due to their potential connections with alcohol use based on the literature review. Controlling for race and ethnicity assisted the researcher in testing whether or not it is viable to study ethnic differences in alcohol use patterns once respondents' immediate environmental differences are controlled because living conditions of the vast majority of military personnel are similar once individuals join the military. Detailed descriptions of each variable, including how the moderator variable was operationalized and tested in AMOS (7.0), are provided in the variable construct section in Chapter IV.

CHAPTER IV

METHODOLOGY

Overview of Research Design

This study investigated multiple contributing factors to alcohol use and alcohol-related consequences on job performance of young male military personnel. This study used a confirmatory approach to using SEM with analyses primarily focusing on model validation through testing the appropriateness and usability of the proposed measurement model (Figure 9) as determined by the model fit statistics. In using SEM, it is common to point out assumptions and major hypotheses of the structural paths in the SEM model rather than explicitly listing every possible connection tested in SEM. By analyzing the 2005 DoD Survey of Health Related Behaviors Among Military Personnel data set using the Analysis of Moment Structures (AMOS) (7.0), the study addressed the following main research questions:

(1) Are stress, drinking motives, and impulsivity useful in explaining the alcohol use and job performance of young adults in the military?;

(2) Do drinking motives mediate the relationship between work stress, family stress, impulsivity, and alcohol use?; and

(3) Does coping moderate the overall relationship between stress and alcohol use after controlling for region, race, marital status, education, and pay grade?

Figure 9. Measurement Model of Stress, Drinking Motives, and Impulsivity Motivated Alcohol Use and Alcohol-Related Consequences of Young Male Military Personnel (*indicates control variables)

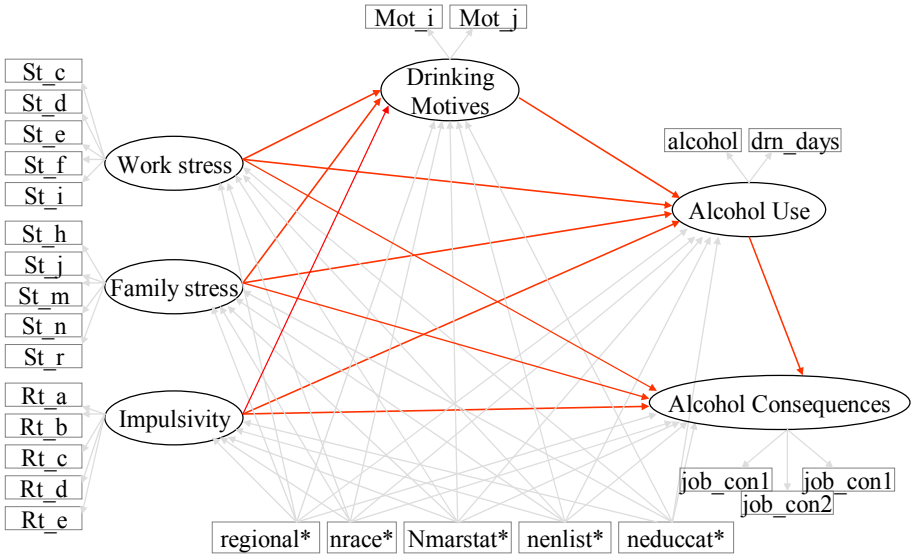


Figure 9 is the measurement model between latent variables (shown in ellipses) measured by a set of recoded manifest variables (or indicators) (shown in rectangles) that are connected by arrows indicating the hypothesized direction of relationships. The indicated paths noted by arrows between the latent variables were assessed to identify predictors of alcohol use and alcohol-related consequences based on the proposed model. A path between alcohol use and alcohol-related consequences was also hypothesized and tested to investigate whether or not there is a direct connection or a causal relationship between the two outcome variables: alcohol use and alcohol-related consequences (job performance). Based on previous research findings, quantity and frequency of alcohol consumed have been suggested to be strongly associated with alcohol-related consequences (Perkins, 2002; Benton

et al., 2006). Furthermore, the model was tested for any moderation effects of coping on the relationship between stress, impulsivity, and alcohol use using a multiple group analysis function in AMOS (7.0) in which the proposed moderator (coping) was considered a group variable that provided the basis for comparison. Since the cross-product term does not need to be directly included in the model when using AMOS (7.0), compared to how it is used in multiple regressions, the coping variable is not directly shown in the proposed model (see Figure 9). A list of detailed descriptions of the indicator variables are provided in Table 1. Tables 4 through 10 present more detailed information (e.g., coding instructions) about the indicators.

Overall, it was anticipated that the proposed model will be useful in understanding the alcohol use patterns of young male military personnel. In other words, the suggested latent independent variables were assumed to be important factors that predict alcohol use and job performance of young male military personnel. After controlling for region, race, marital status, pay grade, and education, it was anticipated that the relationship between stress factors and alcohol use would be mediated by drinking motives (reasons for drinking). In addition, impulsivity was hypothesized to be positively associated with increased alcohol use which consequently results in lowered job performance. Finally, coping level was hypothesized to moderate the relationships between stress, impulsivity and alcohol use.

Table 1. Descriptions of Latent Variables and Indicators

Latent Variable	Indicators	Descriptions
Work Stress	st_c	Problems in my relationships with the people I work with.
	st_d	Problems in my relationship with my immediate supervisors.
	st_e	Concern about my performance rating.
	st_f	Increases in my work load.
	st_i	Insufficient training.
Family Stress	st_h	Conflicts between my military and family responsibilities.
	st_j	Being away from my family.
	st_m	Death in the family.
	st_n	Divorce or breakup.
	st_r	Health problems that my family members had.
Impulsivity	rt_a	I often act on the spur of the moment without stopping to think.
	rt_b	I get a real kick out of doing things that are a little dangerous.
	rt_c	You might say I act impulsively.
	rt_ d	I like to test myself every now and then by doing something a little chancy.
	rt_e	Many of my actions seem to be hasty.
Drinking Motives	mot_i	Drink to forget about your problems.
	mot_j	Drink to cheer up when you're in a bad mood.
Alcohol Use	alcohol	Ethanol consumption during the past 30 days.
	drn_days	Number of days drinking alcohol during the past 30 days.
Alcohol-Related Consequences	job_con1	Personal health problems that affected performance.
	job_con2	Direct effects on job performance due to drinking.
	job_con2	Consequences to respondents' military status as a result of drinking.
Control Variables	Regional	Installation region (APO AP address)
	Nrace	What is your race?
	Nmarstat	What is your marital status?
	Nenlist	What is your pay grade?
	Neduccat	What is your highest level of education now?

The following section describes the secondary data set used in this study, including the sampling design as well as the sample's characteristics. Operationalization and construction of the latent variables and control variables, and the data analysis plan are also discussed. To facilitate a more accurate understanding

and interpretation of the model, a complete list of all survey questionnaire items used in the study is provided in Appendix.

Data and Study Sample Descriptions

The data used for the study came from the 2005 DoD Survey of Health Related Behaviors Among Military Personnel. Since 1980, DoD has conducted eight surveys of military personnel's health behaviors. The 2005 survey (and the 2002 survey) contains the most recent survey questions that inquire about individuals' health behaviors including alcohol and drug use. While not all data sets are available for public use, the 2005 (and the 2002) data have been purposely created for public use, including assurances of maximum protection of respondents' confidentiality while still containing most of the cases from the original data set. Use of the 2005 DoD data set was approved by both the Department of Defense and the University of Texas at Austin Institutional Review Board (IRB) (U.T. Protocol # 2007-08-0112). This approval commenced on October 12, 2007 and is effective until October 10, 2008 unless an extension is requested. A confidentiality agreement was made between the PI and DoD to ensure appropriate use of the data. Furthermore, the researcher completed human subjects training (both required and elective sections on data protection and confidentiality education) through the Collaborative Institutional Training Initiative (CITI) program. As a result, the DoD granted full access to complete elements of the data containing non-sensitive human subjects' information on November 26, 2007 that is effective for one year (Approval reference # CDO-07-2054).

Eligibility criteria for participant inclusion in the 2005 survey are worth discussing in order to better describe the characteristics of the sample used in this study

as well as making inferences about the military population based on the findings of the study. Various military research studies confirm that negative health outcomes are related to psychological impacts as a result of military duty such as deployments or combat experiences. Therefore, in order to increase the likelihood of variation in the sample attributable to these factors and obtain a representative sample of military personnel, those who deployed or in combat should be included in the sample. The DoD health surveys are conducted every 3 years and ideally on all military personnel on active duty. However, certain service members are excluded. They include basic trainees, academy cadets, and midshipmen due to their lack of military experience. In addition, military personnel who were on their way to active duty assignments, undergoing permanent change in station (PCS), and persons absent without official leave (AWOL) are also excluded simply due to difficulties in contacting them and receiving surveys back within the data collection time period. Personnel who are unavailable due to illness or on leave were also ineligible for inclusion.

Survey respondents were randomly selected. Demographic characteristics of the total 2005 DoD sample are provided in Table 2. The 2005 data set contains a total of 16,146 respondents (3,639 Army, 4,627 Navy, 3,356 Marine Corps, and 4,524 Air Force). A majority of respondents are non-Hispanic White males who are married and have at least some college education. The original sampling design of the 2005 survey was a two-stage probability design, where installations were first sampled according to size, and then personnel were randomly sampled within a selected installation. Since 1980, surveys have been administered to active duty members of the military primarily to investigate the prevalence of alcohol use, illicit drug use, tobacco use, and associated

negative consequences. The most recent surveys, conducted in 2002 and 2005, contain questions pertaining to risk taking and impulsive behaviors. The data collection methods included over-sampling of populations with relatively low composite numbers, such as females and those in officer pay grades, to be able to make more accurate inferences about the population.

Table 3 provides information on the sample containing young males aged 18 to 25. This study attempted to create a more homogeneous group for the analyses for various reasons including the study's focus on young males. A total of 3,747 cases out of 16,146 sample cases met the inclusion criteria for the study (i.e., respondents who are male and aged 18 to 25 at the time of survey) were extracted. The demographic characteristics of these young military personnel differed substantially from the total 2005 DoD survey sample that includes male and female military personnel of all ages. For example, the majority of the total sample is married while the majority of the young males are single. In addition, most respondents in the total sample had at least some college education while the highest level of education of most of the young male sample had only a high school education of less.

Table 2. Demographic Compositions of the Total Sample (N=16,146)

Demographic Characteristics	Description		Frequency (%)*
Age Group	18-25		5,595 (34.7%)
(at the time of the survey)	26-34		4,312 (26.7%)
	35 or older		6,236 (38.6%)
Gender	Male		12,119 (75.1%)
	Female		4,027 (24.9%)
Race/Ethnicity	White, Non-Hispanic		9,855 (61.0%)
	Black, Non-Hispanic		2,633 (16.3%)
	Hispanic		2,004 (12.4%)
	Other, Non-Hispanic		1,654 (10.2%)
Marital Status	Not married (Single)		6,138 (38.0%)
	Married		10,008 (62.0%)
Education Level	High school or less		4,309 (26.7%)
	Some college		7,023 (43.5%)
	College degree or more		4,814 (29.8%)
Pay Grade	Enlisted	E1-E3	2,593 (16.1%)
		E4-E6	6,376 (39.5%)
		E7-E9	3,221 (20.0%)
	Officer	W1-W5	399 (2.5%)
		O1-O3	1,444 (9.0%)
		O4-O10	2,113 (13.1%)
Service (Regional) Stratum	Conus (stationed within the U. S.)		9,955 (61.7%)
	Oconus (stationed outside the U. S.)		4,971 (30.8%)
	Afloat		1,220 (7.6%)
Service Type	Army		3,639 (22.5%)
	Navy		4,627 (28.7%)
	Marine Corps		3,356 (20.8%)
	Air Force		4,524 (28.0%)

* Percentage rounded at the second decimal.

Table 3. Demographic Compositions of Sample Young Males Aged 18-25 (N=3,747)

Demographic Characteristics	Description		Frequency (%)*
Race/Ethnicity	White, Non-Hispanic		2,235 (59.6%)
	Black, Non-Hispanic		469 (12.5%)
	Hispanic		628 (16.8%)
	Other, Non-Hispanic		415 (11.1%)
Marital Status	Not married		2,389 (63.8%)
	Married		1,358 (36.2%)
Education Level	High school or less		2,133 (56.9%)
	Some college		1,450 (38.7%)
	College degree or more		164 (4.4%)
Pay Grade	Enlisted	E1-E3	1,588 (42.4%)
		E4-E6	2,038 (54.4%)
	Officer	W1-W5	1 (.0%)
		O1-O3	120 (3.2%)
Service (Regional) Stratum	Conus (stationed within the U. S.)		1,874 (50.0%)
	Oconus (stationed outside the U.S.)		1,441 (38.5%)
	Afloat		432 (11.5%)
Service Type	Army		1,095 (29.2%)
	Navy		918 (24.5%)
	Marine Corps		881 (23.5%)
	Air Force		853 (22.8%)

* Percentage rounded at the second decimal.

Variable Constructs

This section focuses on illustrating the model specification (Figure 9) which consists of visual descriptions of the causal linkages between the latent variables (i.e., independent, mediating, and dependent variables) as well as delineation of the effects of control variables that are hypothesized to describe the alcohol use patterns of young males in the U.S. military. In other words, Figure 9 provides a fundamental idea of how the six latent variables (shown in ellipses) were measured through the number and types of indicators (or manifest variables shown in rectangles) as well as the five demographic factors (region, race, marital status, pay grade, and education level) that were controlled for in the analysis.

A total of six latent variables and twenty-seven indicator variables (including 5 control variables) composed the proposed measurement model. The six latent variables were (1) work stress, (2) family stress, (3) impulsivity, (4) drinking motives, (5) alcohol use, and (6) alcohol-related consequences as measured by job performance. As SEM requires a latent variable to be measured by at least two indicators (Kline, 2005), each latent variable was measured by two or more indicator variables with direct linkages with its corresponding latent variable. Having established the measurement construct of each latent variable, latent variables were then connected by arrows with other latent variables. Demographic factors were observable variables; therefore, they did not need to be constructed as latent variables. However, they were dichotomized for SEM use.

The construct of each latent variable was selected based on relevant theories as well as an extensive literature review; however, there were some constraints in their selection based on the availability of the variables in the data set. Therefore, due to the

nature of the secondary data set used in the study, numerous preliminary statistical steps were taken in finalizing the measurement model. More specifically, establishment of the measurement model was based on three main analytic strategies involved in selecting the best set of indicators for each latent variable: (1) consider the face validity of all latent variables that require variable constructions measured by indicator items in the survey; (2) use factor analysis to evaluate the factor loadings (with rotation if necessary) based on Eigenvalue; and (3) use Cronbach's alpha and item total statistics to determine reliability of the items. Detailed information on these statistical strategies is provided in Chapter V. Despite some limitations as to the accuracy of measurements or standardization issues that may be involved in the original survey, indicator variables were on the whole based on useful questions for composing each latent variable. In other words, the items mimic the key concept of each factor specified in the model for understanding alcohol use patterns of young male military personnel. Complete descriptions on each latent variable are provided in the following sections.

Independent Variables: Work Stress, Family Stress, and Impulsivity

The proposed model included two types of stressors: work stress and family stress. These stress factors were selectively chosen because they are identified as among the most common and major stress factors that impact the lives of people, particularly military personnel. Each stress factor was created by a combination of multiple psychological indicators that measure the core concept of each stressor. Table 4 includes a set of indicator items with the full survey questionnaire items as well as answer options that were used to create the work and family stress variable for this study. Work stress included survey items related to stress experienced by individuals due to work or work

conditions that may involve conflicts or interpersonal issues with coworkers. Family stress was constructed based on survey items that specifically capture stress experienced within one's family or stress caused by separation from family members as part of military duties.

Table 4. Variable Constructs of Work and Family Stress Variables

Latent Variables	Indicators	Descriptions: During the past 12 months, how much stress did you experience from each of the following?	Answer Options
Work Stress	st_c	Problems in my relationships with the people I work with.	1: not at all; 2: a little; 3: some; 4: a lot
	st_d	Problems in my relationship with my immediate supervisor(s).	1: not at all; 2: a little; 3: some; 4: a lot
	st_e	Concern about my performance rating.	1: not at all; 2: a little; 3: some; 4: a lot
	st_f	Increases in my work load.	1: not at all; 2: a little; 3: some; 4: a lot
	st_i	Insufficient training.	1: not at all; 2: a little; 3: some; 4: a lot
Family Stress	st_h	Conflicts between my military and family responsibilities.	1: not at all; 2: a little; 3: some; 4: a lot
	st_j	Being away from my family.	1: not at all; 2: a little; 3: some; 4: a lot
	st_m	Death in the family.	1: not at all; 2: a little; 3: some; 4: a lot
	st_n	Divorce or breakup.	1: not at all; 2: a little; 3: some; 4: a lot
	st_r	Health problems that my family members had.	1: not at all; 2: a little; 3: some; 4: a lot

Besides work and family stress, impulsivity was included as one of three independent variables in predicting alcohol use and alcohol-related consequences. Unlike the situational variable of work and family stress, impulsivity is a personality trait factor conceptualized by multiple behavioral indicators that represent impulsiveness. It is

particularly important in the model because most young adults have not yet developmentally (e.g., neurologically) reached a maturity level that enables them to gain control over impulses or deal with boredom and distraction. Five indicator items were selected to compose the impulsivity variable. Table 5 contains a detailed list of items and answer options that correspond to each item used to construct the impulsivity index score.

Table 5. Variable Construct of Impulsivity Variable

Latent Variable	Indicators	Descriptions: Please indicate how much each statement below describes you.	Answer Options
Impulsivity	rt_a	I often act on the spur of the moment without stopping to think.	1: not at all; 2: a little; 3: some; 4: quite a lot
	rt_b	I get a real kick out of doing things that are a little dangerous.	1: not at all; 2: a little; 3: some; 4: quite a lot
	rt_c	You might say I act impulsively.	1: not at all; 2: a little; 3: some; 4: quite a lot
	rt_d	I like to test myself every now and then by doing something a little chancy.	1: not at all; 2: a little; 3: some; 4: quite a lot
	rt_e	Many of my actions seem to be hasty.	1: not at all; 2: a little; 3: some; 4: quite a lot

Mediating Variable: Drinking Motives (Reasons for Drinking)

Reasons people give for drinking are important factor to consider in constructing a path model of alcohol use. As discussed in the literature review chapter, various studies have suggested that people's psychological expectations or anticipations about the effects of drinking mediate the relationship between stress and drinking. Moreover, people who begin drinking during early life stages learn to believe that alcohol will reduce negative emotions such as tension, anxiety, and other stress-induced negative emotions. Therefore, people are likely to assign positive expectancies as a result, falsely believing that drinking

alcohol offers temporary relieving experiences. In this study, the drinking motives variable was constructed based on two specific aspects of anticipations or expectations that people hope to gain from drinking: forgetting problems and being cheered up when in a bad mood (Table 6).

Table 6. Variable Construct of Drinking Motives

Latent Variable	Indicators	Descriptions: Please tell us how important each reason is to you, for your drinking.	Answer Options
Drinking Motives	mot_i	To forget about your problems.	1: don't drink; 2: not at all important; 3: somewhat important; 4: very important
	mot_j	To cheer up when you're in a bad mood.	1: don't drink; 2: not at all important; 3: somewhat important; 4: very important

Moderating Variable: Coping

Table 7 presents the variable construct of coping. Coping strategies consist of behavioral and cognitive efforts to manage stressful situations. Since studies suggest that individuals typically use multiple tactics when coping with major life events or ongoing stressful situations rather than choosing a single coping style or single strategy (Folkman & Lazarus 1980; Billings, Cronkite, & Moos, 1983; Stone & Neale, 1984), this study reflects the complexity of coping mechanisms by initially dividing the coping strategies into positive and negative coping (Ruzek et al., 2007) instead of three categories used in CISS scale.

Table 7. Variable Construct of Coping

Latent Variable	Indicators	Descriptions (Past 12 months): When you feel pressured, stressed, depressed, or anxious, how often do you engage in each of the following activities?	Answer Options
Coping (cope_pos)	c1	Talk to a friend or family member	1: never; 2:rarely; 3: sometimes; 4: frequently
	c4	Say a prayer	1: never; 2:rarely; 3: sometimes; 4: frequently
	c5	Exercise or play sports	1: never; 2:rarely; 3: sometimes; 4: frequently
	c6	Engage in a hobby	1: never; 2:rarely; 3: sometimes; 4: frequently
	c7	Get something to eat	1: never; 2:rarely; 3: sometimes; 4: frequently
	c9	Think of a plan to solve the problem	1: never; 2:rarely; 3: sometimes; 4: frequently

The underlying assumptions and conceptualization of positive and negative coping style is the utilization of coping methods that brings positive or negative health outcomes or consequences as a result of such actions. In this study, however, only positive coping was used to define the coping variable. Although people are likely use both positive and negative coping strategies, the extent to which survey participants utilized positive coping strategies is better represented in the data set than are negative coping strategies. For example, the 2005 DoD data set contains only two items that measure negative coping strategies: drinking or smoking. The problem with using these two indicators to measure for negative coping in this study is that the negative coping by

drinking variable is analogous to the dependent variable alcohol use. In other words, alcohol use is an outcome not an indicator variable in this study, and it cannot be used as both in the sample analysis. There were also difficulties combining the positive and negative coping strategies as an index score; therefore, in this study, coping was measured in terms of the extent to which positive coping strategies were used to deal with stress. Therefore, despite many previous studies that support the notion of negative coping strategies and its moderating effect on the relationship between stress and alcohol use, this study only included positive coping items. The initial coping variable 'cope_pos' was created by producing a mean of the six indicator items in Table 7. However, because the coping variable as a moderator should be in a grouping format, 'cope_pos' was used as a basis for subdividing the level of coping into three groups (low, medium, and high) from the summated total score. To create two distinctive groups for comparison, only the high and low groups were used for the multiple group analysis that allowed model comparisons based on the coping level.

Dependent Variables: Alcohol Use and Job Performance

Two major outcome variables were structured into the proposed model (Figure 9). One is alcohol use in the past 30 days, and the other is alcohol-related consequences, in particular job performance. First, alcohol use was measured by two indicator items: alcohol and drinking days (drn_days) (Table 8). Table 8 is a summary of the two indicator items that composed alcohol use including the calculation methods of the alcohol variable that included a measure of ethanol concentration. It is recommended that a latent variable have at least two indicator variables (Kline, 2005), thus, an item (Edq16;

recoded into drn_days) that inquired about the overall frequency of drinking during the reference time period of 30 days was included as the other indicator.

Table 8. Variable Construct of Alcohol Use

Latent Variable	Indicators	Descriptions	Answer Options
Alcohol Use	Drn_days	During the past 30 days, on how many days did you drink alcohol? [# of days]	1 (didn't drink): 0; 2: 1; 3: 2.5; 4: 7; 5: 15; 6: 24; 7: 29
	Alcohol	Ethanol consumption during the past 30 days	Computation Method
			Alcohol = Beer+ Wine+ Liquor = [edq18*edq19*edq20]+[edq21*edq22* edq23] + [edq24*edq25*edq26]

Table 9 lists survey items used to create the alcohol index score. Alcohol was computed as a quantitative measure of frequency and quantity of drinks that was calculated by computing ethanol concentration so that different types of alcohol in beverages were measured and calculated using the same criteria: average ethanol consumption in the last 30 days. Compared to some studies that have utilized index scores based on survey questionnaires that ask about drinking during the past 12 months, this study specifically used average ethanol consumption in the past 30 days as the reference period. This decision was made based on suggestions by Sanchez-Craig (1996) that a 30-day time interval for drinking history is considered appropriate for a creation of a valid index of recent drinking given that recall for the past 30 days is likely more accurate than recalling for the past 90 or 12 months of drinking. Drinking over 30 days is also believed to be highly correlated with drinking over 90 days.

Table 9. Descriptions of Alcohol Measure Components

Indicator	Survey Items		Descriptions (past 30 days)	Answer Options
Alcohol	Beer	Edq18	How many days did you drink beer? [# of days]	1: 0; 2: 1; 3: 2.5; 4: 7; 5: 15; 6: 23.5; 7: 29
		Edq19	What size cans or bottles of beer did you usually drink? [12oz.=1]	1: .67; 2: 1; 3: 1.33; 4: 2.67; 5: 3.33; 6 (some other size): 2; 7: 0(didn't drink)
		Edq20	How much beer did you usually drink on a typical day when you drank beer? [# of beers]	1: 0; 2: 1; 3: 2; 4: 3; 5: 4; 6: 5; 7: 6; 8: 7; 9: 8; 10: 10; 11: 13; 12: 16; 13: 18
	Wine	Edq21	How many days did you drink wine? [# of days]	# of days (on avg.) 1: 0 days; 2:1; 3:2.5; 4:7; 5:15; 6:23.5; 7: 29
		Edq22	Did you usually drink a regular wine or a fortified wine? [type of wine] Note: regular wine (12%), fortified wine (17- 21% =avg. 19%), wine cooler (4-6%= avg. 5%)	1 (regular): 1; 2 (fortified): 1.58; 3 (winecooler): .42; 4 (didn't drink): 0
		Edq23	How much wine did you usually drink on a typical day when you drank wine? [# of wine glasses]	1: 0; 2: 1; 3: 2; 4: 3; 5: 4; 6: 5; 7: 6; 8: 7; 9: 8; 10: 10; 11: 12
	Liquor	Edq24	How many days did you drink liquor? [# of days]	# of days (on avg.) 1: 0 days; 2:1; 3:2.5; 4:7; 5:15; 6:23.5; 7: 29
		Edq25	About how many ounces of liquor did you usually have in your regular drink? [1.5oz.=1]	1 (didn't drink): 0; 2: .67; 3: 1; 4: 1.33; 5: 2; 6: 2.67; 7:3.33
		Edq26	How much liquor did you usually drink on a typical day when you drank liquor? [# of drinks]	1: 0; 2: 1; 3: 2; 4: 3; 5: 4; 6: 5; 7: 6; 8: 7; 9: 8; 10: 10; 11: 13; 12: 16; 13: 18

The 30-day ethanol measure was used to create an index score of ethanol concentration using both quantity and frequency of alcohol consumption regardless of types or size of alcohol beverages, yielding a range of interval scores desirable for the planned SEM analyses. Beer, wine, and liquor each contain different ethanol

concentration; therefore, three types of alcohol was computed based on their ethanol concentration (i.e., 12oz of beer = 4oz wine = 1.5oz liquor) multiplied by the quantity and frequency of drinking so that each makes a comparative measure. To obtain a linear indicator of frequency or quantity of drinking, answers that contain ranges were recoded using the midpoints for each category. After each variable was recoded, an index score of each alcohol beverage was created by multiplying the frequency (i.e., edq18, edq21, and edq21), type or size (i.e., edq19, edq22, and edq25); and quantity of each alcohol beverage (i.e., edq20, edq23, and edq26). For example, total ethanol of beer was calculates by multiplying edq18, edq19, and edq20. Total ethanol of wine was calculated by multiplying edq21, edq22, and edq23. Finally, total ethanol of liquor was calculated by multiplying edq24, edq25, and edq26. Then, alcohol was measured by totaling the concentration of ethanol of beer, wine, and liquor, which represents the average ethanol consumed in past 30 days. For detailed information on original scaling and recoding of each item, see Appendix.

Table 10. Variable Construct of Alcohol-Related Consequences (Job Performance)

Latent Variable	Indicators (Index Score)	Items	Descriptions (Past 12 months)	Answer Options
Alcohol-Related Consequences	Job_con1	b1	I was hurt in an on-the-job accident because of my drinking.	1 (don't drink): 0; 2: 0; 3: 1; 4: 2
		b3	I did not come to work at all because of a hangover, an illness, or a personal accident caused by drinking.	1 (don't drink): 0; 2: 0; 3: 1; 4: 2
		b9	I had an illness connected with my drinking that kept me from duty for a week or longer.	1 (don't drink): 0; 2: 0; 3: 1; 4: 2
	Job_con2	b2	I was late for work or left work early because of drinking, a hangover, or an illness caused by drinking.	1 (don't drink): 0; 2: 0; 3: 1; 4: 2
		b4	I worked below my normal level of performance because of drinking, a hangover, or an illness caused by drinking.	1 (don't drink): 0; 2: 0; 3: 1; 4: 2
		b5	I was drunk while working.	1 (don't drink): 0; 2: 0; 3: 1; 4: 2
		b6	I was called in during off-duty hours and reported to work feeling drunk.	1 (don't drink): 0; 2: 0; 3: 1; 4: 2
	Job_con3	b7	I didn't get promoted because of my drinking.	1 (don't drink): 0; 2: 0; 3: 1; 4: 2
		b8	I got a lower score on my efficiency report or performance rating because of my drinking.	1 (don't drink): 0; 2: 0; 3: 1; 4: 2
		b10	I received UCMJ punishment (Court Martial, Article 15, Captain's Mast, Office Hours) because of my drinking.	1 (don't drink): 0; 2: 0; 3: 1; 4: 2

The other outcome variable is the alcohol-related consequences variable (job performance) measured by an index score composed of the three indicators noted in Table 10 above. Alcohol-related negative consequences was measured by using the

following three domains of job performance: personal health problems that affected performance (job_con1); direct effects on job performance due to drinking (job_con2); and consequences to respondents' military status as a result of drinking (job_con3). In the 2005 DoD survey, adverse effects associated with alcohol use were assessed with a reference period of consequences in the past 12 months by inquiring about numerous areas in which respondents failed to function due to drinking. Those included being passed over for promotion because of drinking; lower scores on performance rating because of drinking; loss of one week or more from duty because of drinking-related illness; arrests for driving while impaired (DWI); alcohol-related arrests other than DWI; alcohol-related incarcerations; alcohol-related injury to service person (Bray et al., 2003).

Control Variables: Region, Race/Ethnicity, Marital Status, Pay Grade, and Education Level

Numerous alcohol research studies have identified associations between demographic factors and alcohol use. Controlling for such factors in this study was expected to yield a more accurate picture of young adults' alcohol use and alcohol-related consequences. The five control variables (service region, race/ethnicity, marital status, pay grade, and education level) were derived and recoded directly from the demographic factors available from the 2005 DoD data set (Table 11). They were dichotomized for purposes of the analysis. Arrows present direct paths between the control variables and the latent variables. Therefore, paths between latent variables present the direct path coefficients between the independent, mediating, and dependent variables after eliminating effects of the control variables (Figure 9).

Table 11. Variable Construct of Five Control Variables

Control Variables	Indicators	Descriptions	Answer Options
Service Region	Regional	Installation region (APO AP address)	1: within the United States; 0: outside the United States
Race/ Ethnicity	Nrace	What is your race?	1:nonHispanic White; 0: other
Marital Status	Nmarstat	What is your marital status?	1: married; 0: unmarried
Pay Grade	Nenlist	What is your pay grade?	1: enlisted; 0: officer
Education Level	Nedducat	What is your highest level of education now?	1: high school or less; 0: some or more

Data Analyses

Data analyses in this study were conducted in roughly five phases. First, data cleaning stage included case-wise deletion of missing values or responses that included no response, multiple responses, bad data in cases of which respondents gave an answer that was inconsistent with answers provided to other related questions or respondents gave an out-of-range answer such as extreme outliers, or not applicable (N/A). In this particular secondary data file (i.e., 2005 military health data), missing values or bad data had already been addressed and assigned the following values: -3 not applicable; -5 bad data, logically assigned; -6 multiple responses; -8 blank (no response); and -9 legitimate skip (Bray et al., 2003). Therefore, those cases with any of the above answers were excluded from the analyses through recoding and treating them as systematic missing. In addition, cases that were above 4SDs (14 cases) were considered outliers, hence eliminated from the analysis. Although the exclusion of the outliers were expected to make very little difference in terms of model fit and path coefficients due to the fact that

the current study used a large sample size, the decision was based on the statistical convention and what seemingly could be reasonable in terms of drinking. Second, preliminary statistical steps were performed to establish a good model structure based on factor loadings as well as internal consistency reliability coefficients of the items that correspond to the latent variables. Basic descriptive statistics were also used to examine the assumptions (e.g., sample size and normality) before evaluating the model in the SEM analysis. The third phase included model-fit testing to examine whether or not the structural model fit the 2005 DoD data. Although SEM mainly uses chi-square statistics to evaluate model fit, chi-squares is also very sensitive to normality assumptions as well as large sample size. Therefore, two other fit indices, the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA CFI and RMSEA), were used to supplement the results of model fit. Then, mediating effects of drinking motives between stress, impulsivity and alcohol use were also examined using a bootstrapping method that tests the direct, indirect, and total effects in SEM. Finally, a multiple group analysis[1] was conducted to examine any possible moderating effect of coping on the model. Reports on these data analysis steps as well as specifications of path and variance estimates are presented in further detail in Chapter V. The following sections further describe the SEM data analysis plans including model-fit testing and considerations of appropriate sample size.

[1] Coping variable is not directly shown in the SEM. However, when examining the moderating effects of coping, the variable is used as the grouping variable for the multiple group analysis in Amos (4.0).

SEM Analysis

This study used a *confirmatory approach* to SEM in which the goodness-of-fit tests determined if the patterns of variances and covariances in the data are consistent with the hypothesized structural model. Using AMOS (7.0), the proposed measurement model (Figure 9) was tested on the relationships between the combinations of the latent variables to predict alcohol use and job performance. SEM extends path analysis by observing latent variables which help to confirm complex associations between multiple variables (Kline, 2005) such as those used in this study. Standardized path coefficients are drawn as bold arrows between the latent variables as shown in the final models in Chapter V. SEM also takes into account the modeling of interactions, nonlinearities, correlated independent variables, measurement error, correlated error terms, multiple latent independent variables (each measured by two or more indicators), and one or more latent dependent variables, (each also measured by multiple indicators). AMOS (7.0) is the most current software version and is known for its user-friendly graphical interface that offers an easy way of specifying structural models (Kline, 2005).

Multiple fit indices are available to provide statistical information to examine whether or not the proposed model fits the data. The hypothesized model of this study was assessed mainly by three of these fit indices: CMIN (Chi-square), the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). CMIN, degrees of freedom, and associated p-values were used to determine the overall model-fit. In running a single baseline model, a non-statistically significant CMIN indicates that there is a good model fit. If CMIN indicates that the chi-square statistically is significant, the model fit is considered unsatisfactory. However, the chi-square statistic is sensitive to

sample size, i.e., larger samples tend to produce a significant chi-square statistic regardless of whether the model shows a good fit to the data; therefore, two other measures of fit were used to supplement CMIN: CFI and RMSEA. CFI is based on the comparison between the hypothesized model and the baseline model and ranges from 0 to 1. A CFI higher than .9 is sought, with .95 or higher being an excellent fit (Bentler & Bonett, 1980; Hu & Bentler, 1999; Ullman, 2001). According to Browne and Cudeck (1993), RMSEA values less than .05 indicate a good fit, values between .05 and .08 indicate a moderate fit, values between .08 and .1 indicate a mediocre fit, and values greater than .1 are considered a poor fit.

Multiple Group Analysis: Testing for Moderation

AMOS (7.0) is considered a powerful statistical tool, particularly in testing moderating effects with complicated structural models. In using SEM, no specific modeling design is required to test for moderating effects, but the single measurement model is applied to all groups defined by the grouping variable, which then is simultaneously estimated for structural equivalences of the model across different groups. To determine whether coping moderates the effect of stress and impulsivity on alcohol use and alcohol-related consequences, the associations were tested using two subgroups of participants: participants with high versus low levels of coping based on a third-tile split on the coping index score. Although including the medium coping group may be logical, this group essentially functioned as a basis to clearly differentiate the high and low coping group by eliminating values that fall in between the high and low groups. These middle-range values can be ambiguous for interpretation. Three statistical measures were used and compared to assess moderation effects: unconstrained chi-

square, measured weights, and structural weights. The model should fit the data and should apply to all groups in order to move to the next step to determine any moderation effects of coping. Based on SEM output, if (1) the model fits the data, (2) the model applies to all groups, and (3) there is a statistical difference in the model chi-square statistics between the two groups defined by the coping variable, it can be concluded that there are moderations effects because the model structure is not equal across groups. Consequently, it would be fair to conclude that the model is non-invariant across groups, thus further requiring exploratory analysis to point out factors that are related to the non-invariance.

Bootstrapping Method: Testing for Mediation

A bootstrap method was used to estimate standard errors for the indirect effects of drinking motives on the relationships between stress factors, impulsivity, and alcohol use. The existence of the indirect effect from each independent variable to alcohol use through drinking motives is determined with a p-value (alpha set at the .01) associated with the estimated standard error as well as a 95% confidence interval (either standardized or unstandardized).

Sample Size

An important issue in research design involves the determination of a sample size sufficient to ensure adequate power, or in SEM, the model fit. There are several suggestions for deciding on sufficient sample size. Since SEM is an extension of a general linear model, it may be reasonable to follow Stevens's (2002) suggestions of having 15 cases per predictor in a standard ordinary least squares multiple regression analysis. In SEM, each measured variable usually has three parameters: its path

coefficient, its variance, and the disturbance term. Therefore, for 27 predictor variables, there should be at least 405 cases to achieve adequate power for this study. To have confidence in the goodness of fit test, Hoyle (1995) and Loehlin (2004) suggested that a sample size of 100 cases is required with 200 being better when a model has two to four factors. The final sample size from the 2005 DoD Data contained 1,715 cases that meet the inclusion criteria for this study and therefore makes the sample size question a non issue.

CHAPTER V

RESULTS

This chapter presents the results of the data analyses. The highlight of the study is the structural equation model and its usability in terms of significant predictor variables and their relation to alcohol use and alcohol-related consequences. However, because important steps were involved in establishing the finalized measurement model prior to testing it with AMOS (7.0), the following section begins with explicit explanations of model building strategies as well as corresponding statistical results to support the development of the final model (Figure 9). Descriptive information on demographic characteristics of the final sample and findings of study variables are also presented followed by results of bivariate analyses of indicator variables. Finally, results of SEM analyses are shown with a primary focus on addressing the study's major research questions. Multiple fit indices and standardized correlation coefficients that were used to examine the model structure are presented. The Mediating effects of drinking motives are discussed in terms of direct and indirect effects. The Moderating effects of coping are also discussed based on the results of the multiple group analysis using AMOS (7.0). The statistical analyses that follow are based on the final sample of 1,701 young male military personnel who were aged 18 to 25 at the time of the 2005 DoD survey[2].

[2] Outliers (>4SDs) were excluded from the final sample due to a significantly high skewed distribution of the alcohol variable. Transforming the alcohol use made little different in the results. Therefore, the analysis was based on the sample without the cases that fell beyond 4 standard deviations.

Preliminary Analyses of the Measurement Model

To provide evidence to support the finalized construction of the measurement model (Figure 9), two main statistical strategies were incorporated using the Statistical Package for the Social Sciences (SPSS 13.0): factor analysis and reliability analysis. After establishing the theoretical conceptualization of the model (Figure 1) through an extensive literature review, factor analyses on latent variables were first conducted. Factor analysis was used to derive a single latent factor that maximizes the pattern covariance. Eigenvalue and the distribution of factor loadings were used to determine whether the indicators load to the latent variables in correspondence to the way the researcher had linked them in the conceptual model. Factor unit Eigenvalue above 1 were counted as valid. Table 12 shows the results of principal axis factoring of the latent variables except for alcohol use.

Table 12. Results of Principal Axis Factoring

Analysis Components	Work stress	Family stress	Impulsivity	Drinking motives	Coping	Alcohol-related consequences
# of Factors	1	1	1	1	1	1
Eigenvalue	2.677	2.188	3.313	1.718	2.475	1.472
Range of Factor Loading	.488-.784	.374-.661	.701-.829	.847	.423-.700	.411-.575

Specifics on dimensional measures are provided in Tables 13 and 14. The number of factors extracted and the Eigenvalue confirmed that all each variable formed one factor with good factor loadings to each latent variable in correspondence to the way it was hypothesized and intended for measurement. In addition, all five indicator items of work stress (Table 4) turned out to be good indicators with factor loadings ranging

between .488 and .784. Likewise, indicator items of family stress (Table 4), impulsivity (Table 5), drinking motives (Table 6), coping (Table 7), and alcohol-related consequences (Table 10) all loaded to one factor which showed statistical evidence as to the linkages hypothesized in the conceptual model.

Table 13. Dimensional Measures of Stress

Latent Factors	Factor Loadings	Items	Descriptions (past 12 months)
Work Stress	.736	st_c	Stress experience from problems in my relationships with the people I work with.
	.784	st_d	Stress experience from problems in my relationship with my immediate supervisor(s).
	.635	st_e	Stress experience from concern about my performance rating.
	.584	st_f	Stress experience from increases in my work load.
	.488	st_i	Stress experience from insufficient training.
Family Stress	.661	st_h	Stress experience from conflicts between my military and family responsibilities.
	.631	st_j	Stress experience from being away from my family.
	.483	st_m	Stress experience from death in the family.
	.374	st_n	Stress experience from divorce or breakup.
	.562	st_r	Stress experience from health problems that my family members had.

Table 14. Dimensional Measures of Impulsivity, Drinking Motives, Coping, and Alcohol-Related Consequences

Latent Factors	Factor Loadings	Items	Descriptions (past 12 months)
Impulsivity	.719	rt_a	I often act on the spur of the moment without stopping to think.
	.701	rt_b	I get a real kick out of doing things that are a little dangerous.
	.829	rt_c	You might say I act impulsively.
	.773	rt_d	I like to test myself every now and then by doing something a little chancy.
	.779	rt_e	Many of my actions seem to be hasty.
Drinking Motives	.847	mot_i	How important is drinking to forget about your problems.
	.847	mot_j	How important is drinking to cheer up when you're in a bad mood.
Coping	.523	c1	Talk to a friend or family member when you feel pressured, stressed, depressed, or anxious.
	.447	c4	Say a prayer when you feel pressured, stressed, depressed, or anxious.
	.626	c5	Exercise or play sports when you feel pressured, stressed, depressed, or anxious.
	.700	c6	Engage in a hobby when you feel pressured, stressed, depressed, or anxious.
	.423	c7	Get something to eat when you feel pressured, stressed, depressed, or anxious.
	.524	c9	Think of a plan to solve the problem when you feel pressured, stressed, depressed, or anxious.
Alcohol-Related Consequences	.575	job_con1	Index score of b1, b3, and b9
	.475	job_con2	Index score of b2, b4, b5, and b6
	.411	job_con3	Index score of b7, b8, and b10

Table 15. Results of Reliability Analysis

	Work stress	Family stress	Impulsivity	Drinking motives	Coping	Alcohol-related consequences
Cronbach's alpha	.781	.673	.871	.833	.713	.634
Range of Inter-item correlation	.327-.674	.169-.491	.481-.679	.713-1.00	.178-.502	.274-.535

Table 15 shows the results of the reliability analysis. To establish internal consistency of each latent variable in the model, Cronbach's alpha (.7 used as the cut off point), inter-item correlation matrices and item-total statistics are reported. Because Cronbach's alpha generally increases as the correlations between the items increase, the correlation coefficients were expected to provide sufficient information on the unidimensionality of each latent variable. No indicators were excluded from the model because the Cronbach's alphas for each indicator were close to or greater than .7. Dimensionality results indicate that there was largely a good item fit for the work stress, family stress, impulsivity, drinking motives, coping, and alcohol-related consequences variables. Except for family stress (Cronbach's alpha of .673), Cronbach's alphas for all other latent variables were above the recommended value of .7, indicating unidimensionality of the variables. The inter-item correlation coefficients showed a wide range of values. For example, the inter-item correlation of work stress ranged from .327 to .674; family stress .169 to .491; impulsivity .481 to .679; drinking motives .713 (only one correlated is reported because only two indicator items were used for this variable); coping .178 to .502; and alcohol-related consequences .274 to .535. In essence, the indicator variables were generally useful in composing the latent variables. The factor analysis and reliability analysis provided sufficient statistical evidence to establish a good measurement model that support the study's intent in analyzing alcohol use patterns of young male military personnel from both developmental and psychological perspectives.

Demographic Characteristics of the Final Sample

Data on a final sample of 1,701 young males aged 18 to 25 were analyzed after eliminating 14 cases that were considered outliers. The study initially attempted log-transforming the alcohol variable to determine whether or not using the transformed variable made any difference in terms of the model fit as well as the path coefficients between the latent variables as a result of adjusting for the highly skewed distribution the variable. However, the findings were consistent regardless of the transformation strategy. Therefore, instead of using a transformed dependent variable, outliers were defined as respondents reporting 805 or more bottles of 12oz beers within the 30-day period. As a result, cases excluded from the analysis contained respondents who drank between a minimum of 805 and maximum of 2521 bottles of 12oz beers within the 30-day period. These are equivalent to consuming more than 27 drinks per day. Although the current study could have excluded respondent who consumed more than 618 drinks (SD=3) within the 30-day period, those cases that fell between 3 to 4 SDs were included in the analysis for two reasons: (1) there were a significant number of respondents who drank between 618 (SD=3) and 805 bottles (SD=4) of beer; and (2) it was reasonable to think that people, who already developed alcohol dependence, can drink extreme amount of alcohol.

Table 16 shows the demographic characteristics of the sample used in the study. Of the 1,701 cases, the majority of respondents were unmarried (63%) non-Hispanic Whites (65%) who were at an enlisted pay grade (i.e., rank) (95%). Approximately 52 percent had finished high school or acquired a GED, and 48 percent had at least some college education at the time of the survey. In addition, about 58 percent of the final

sample was stationed within the United States while 42 percent were stationed abroad. Finally, one-third of the study sample was serving in the Army, followed by the Marine Corps, the Air Force, and the Navy, respectively. The demographic composition of the final sample approximated the characteristics of the original sample that met the criteria for study inclusion (i.e., young males aged 18 to 25, N=3,747) before case-wise deletion.

Table 16. Demographic Compositions of Sample Young Males Aged 18-25 (N=1,701)

Demographic Characteristics	Description	Frequency (%)*
Race/Ethnicity	White, Non-Hispanic	1,111 (65.3%)
	Other (non non-Hispanic White)	590 (34.7%)
Marital Status	Not married	1073 (63.1%)
	Married	628 (36.9%)
Education Level	High school or less	881 (51.8%)
	Some college or more	820 (48.2%)
Pay Grade	Enlisted	1,615 (94.9%)
	Officer	86 (5.1%)
Service Region	Conus (stationed within the U. S.)	981 (57.7%)
	Oconus (stationed outside the U. S.)	720 (42.3%)
Service Type	Army	577 (33.9%)
	Navy	232 (13.6%)
	Marine Corps	450 (26.5%)
	Air Force	442 (26.0%)

* Percentage rounded at the second decimal.

The characteristics of the final sample (N=1,701) were also a fair representation of the active-duty military population. To further determine the sample's representativeness, the weighted data were produced using the weight variable 'finalwt' from the original data set to compute the weighted sum of the survey-eligible military personnel, equaling 1,011,852 individuals. Then, the demographic compositions were compared specifically to young males aged 18 to 25 (N=178,817) as shown in Table 17. The results showed that except for service region, the demographic information in Table

16 (N=1,701) by and large represent the race/ethnicity, marital status, education level, pay grade (rank), and service type distributions of the target population of all those eligible for survey participation. Therefore, the findings of the study may be generalized to the military population for those who meet the survey inclusion criteria.

Table 17. Demographic Compositions of Weighted Sample of Young Males Aged 18-25 (N=178,817)

Demographic Characteristics	Description	Frequency (%)*
Race/Ethnicity	White, Non-Hispanic	128,335 (71.8%)
	Other (non non-Hispanic White)	50,461 (28.2%)
Marital Status	Not married	114,217 (63.9%)
	Married	64,599 (36.1%)
Education Level	High school or less	92,094 (51.5%)
	Some college or more	86,723 (48.5%)
Pay Grade	Enlisted	165,754 (92.7%)
	Officer	13,063 (7.3%)
Service Region	Conus (stationed within the U. S.)	126,171 (70.6%)
	Oconus (stationed outside the U. S.)	52,646 (29.4%)
Service Type	Army	75,906 (42.4%)
	Navy	23,033 (12.9%)
	Marine Corps	37,762 (21.1%)
	Air Force	42,116 (23.6%)

* Percentage rounded at the second decimal.

Descriptive Findings of Study Variables

The needs to test or report normality as well as the effects of non-normal variables are ongoing issues in the SEM literature. However, it is worth knowing each variable's distribution in order to better understand the nature of the data set. In using Chi-square statistics, samples are usually evaluated for normality of distribution and outliers. Tables 18, 19, and 20 present a summary of the mean (ordinal variables were recoded and treated as interval), standard deviation, skewness, and kurtosis of all indicators of latent

variables in the study. Control variables were dichotomized; therefore, they are excluded from the analysis. Higher values of stress and impulsivity indicate greater stress levels and greater impulsivity. Higher values of drinking motives indicate that people are more inclined to drink in order to forget about problems or to cheer up when they are in a bad mood. Higher coping values represent greater use of positive coping strategies. Higher values of alcohol use indicate greater drinking ethanol (alcohol) consumption in the past 30 days. Finally, higher values of alcohol-related consequences mean lower job performance.

Stress

Young males in the sample generally reported that they experienced a little stress in all five domains of work stress (relationship problems with coworkers, relationship problems with immediate supervisor(s), concern about performance rating, increase in work load, and insufficient training). There were, however, those who reported some to a lot of stress in the five domains: relationship problems with coworkers (26%); relationship problems with immediate supervisor(s) (24%); concern about performance rating (16%); increase in work load (31%); and insufficient training (19%).

In terms of family stress, respondents generally felt none to a little stress in the four domains (conflicts between military and family responsibilities, death in the family, divorce or breakup, and health problems of family members). As with work stress, same respondents reported some to a lot of stress in the four family stress domains: conflicts between military and family responsibilities (21%); death in the family (11%); divorce or breakup (12%); and health problems of family members (15%). Of the five indicator items of family stress, stress due to being away from their family stood out with 38

percent of the total sample reporting some to a lot of stress as a result of separation from family members.

Table 18. Mean, Standard Deviation, and Normality of Stress, Impulsivity, Drinking Motives, and Coping

Latent Variables	Indicators	Mean (SD)*	Skewness*	Kurtosis*
Work Stress	Problems with people at work (st_c)	1.91 (1.00)	.79	-.53
	Problems with immediate supervisor (st_d)	1.81 (1.02)	.96	-.38
	Concern about performance rating (st_e)	1.55 (.88)	1.49	1.13
	Increases in work load (st_f)	2.01 (1.08)	.64	-.94
	Insufficient training (st_i)	1.66 (.95)	1.26	.39
Family Stress	Conflicts between military and family responsibility (st_h)	1.68 (1.00)	1.23	.16
	Being away from my family (st_i)	1.16 (.57)	3.80	13.89
	Death in the family (st_m)	1.34 (.79)	2.29	4.08
	Divorce or breakup (st_n)	1.38 (.85)	2.19	3.45
	Family health problems (st_r)	1.49 (.89)	1.72	1.70
Impulsivity	Act without stopping to think (rt_a)	2.19 (.84)	.49	-.22
	Get a real kick out of doing things that are a little dangerous (rt_b)	2.32 (.99)	.25	-.97
	I act impulsively (rt_c)	2.18 (.94)	.56	-.48
	Do things a little chancy (rt_d)	2.18 (.94)	.35	-.80
	Many of my actions seem to be hasty (rt_e)	1.74 (.84)	1.01	.37
Drinking Motives	Drink to forget about problems (mot_i)	2.37 (.64)	1.49	.96
	Drink to cheer up when in a bad mood (mot_j)	2.42 (.65)	1.27	.38
Coping	cope_pos (index score of c1-c9)	2.66 (.65)	-.56	.11
	Talk to a friend or family member (c1)	2.97 (.98)	-.63	-.62
	Say a prayer (c4)	2.24 (1.09)	.24	-1.29
	Exercise or play sports (c5)	2.63 (1.03)	-.23	-1.08
	Engage in a hobby (c6)	2.74 (1.03)	-.38	-.92
	Get something to eat (c7)	2.32 (.96)	.09	-1.01
	Think of a plan to solve the problem (c9)	3.07 (1.02)	-.87	-.40

* Percentage rounded at the third decimal.

Impulsivity

On average, young males reported a little to some degree of impulsivity in the following five domain (I often act on the spur of the moment without stopping to think, I get a real kick out of doing things that are a little dangerous, I act impulsively, I like to test myself every now and then by doing something a little chancy, and many of my actions seem to be hasty). About 40 percent the sample endorsed each of the five items with the largest number of endorsement going to get a real kick out of doing things that are a little dangerous. At least one-third of the sample (35%) reported to like to test themselves every now and then by doing something a little chancy, 30 percent who acted on the spur of the moment without stopping to think, 28 percent who acted impulsively, and 16 percent whose actions seem hasty.

Drinking Motives

Most young adults in the sample reported that drinking to forget about problems or to cheer up in when in a bad mood as not at all important. However, about 29 percent reported that drinking to forget about problems is somewhat to very important, and 33 percent reported that drinking to cheer up when in bad mood is somewhat to very important.

Coping

The coping variable was created as an index score 'cope_pos' using means of 6 survey items that captured the concept of positive coping strategies. Table 16 shows the mean, standard deviation, skewness and kurtosis of the index score 'cope_pos' as well as the six items used to compute it. The overall coping score 'cope_pos' showed a fairly good presentation of the six indicator items. Except for saying a prayer, on average, most

young males in the sample responded that they sometime use the following strategies to deal with stress: talk to a friend of family member; exercise or play sports; engage in a hobby; get something to eat; or think of a plan to solve the stress inducing problems. Apparently these young males did not say a prayer as much as they use other types of positive coping methods in situations where they felt pressured, stress, depressed, or anxious.

Alcohol Use

Table 19 shows the descriptive information on the variable construct of the two outcome variables: alcohol use and alcohol-related consequences. On average, young males in the sample consumed 89 bottles of 12oz beers within the 30-day period, which translates to about three 12oz beers per day or about 22 12oz beers every weekend. This is equivalent to 89 glasses of 4oz wine or 89 shots of 1.5oz liquor during the 30 day period. Quantity of alcohol consumed, however, shows a highly positively skewed distribution ranging between .67 to 771 bottles during the 30-day period. Therefore, it may be worth reporting the median which is approximately 42 bottles of 12oz beer consumed within the 30-day reference period. Without knowing the median, the mean statistics may distort the prevalence of alcohol use among young males in the military. Additionally, the sample on average drank 8 days (or a median of 7 days) out of 30 days. In other words, young males on average drank a total of 5 to 6 bottles of 12oz beer per day when they drank.

Table 19. Mean, Standard Deviation, and Normality of Alcohol Use and Alcohol-Related Consequences

Latent Variables	Indicators (in the past 30 days)	Mean*	SD*	Skewness*	Kurtosis*
Alcohol Use	Alcohol [Beer+Wine+Liquor] (total ethanol amount)	89.17	125.02	2.53	7.10
	Beer (total ethanol in beer)	46.51	70.79	3.13	13.60
	Frequency of drinking beer	6.55	6.71	1.47	1.68
	Size of beer	.98	.50	1.57	8.63
	Quantity of beer	5.00	3.98	1.07	.92
	Wine (total ethanol in wine)	2.04	7.44	6.83	57.43
	Frequency of drinking wine	.65	1.88	7.13	80.68
	Type of wine	.26	.47	1.40	.38
	Quantity of wine	.65	1.50	3.41	15.18
	liquor (total ethanol in liquor)	40.62	81.17	3.48	14.41
	Frequency of drinking liquor	3.67	4.74	2.26	6.23
	Size of liquor	1.38	1.15	.41	-1.07
	Quantity of liquor	2.97	2.78	.86	-.03
	Frequency of drinking	7.75	6.87	1.41	1.53
Alcohol-Related Consequences (due to drinking)	Personal health problems	.03	.24	13.39	256.75
	b1(Hurt in an on-the-job)	.00	.06	24.46	656.79
	b3(Illness, hangover, accident)	.23	.17	8.33	76.01
	b9(Illness related to drinking)	.00	.07	21.82	528.43
	Direct effects on job	.49	1.16	3.00	9.91
	b2(late/left early)	.13	.42	3.42	11.06
	b4(work below normal)	.21	.55	2.48	4.84
	b5(drunk while working)	.08	.36	4.45	19.30
	b6(work feeling drunk)	.07	.30	4.99	23.64
	Effect on military status	.09	.44	6.23	46.11
	b7(didn't get promoted)	.02	.17	7.63	64.27
	b8(lower performance score)	.02	.16	7.48	61.44
	b10(received punishment)	.40	.22	5.98	38.90

* Percentage rounded at the third decimal.

Table 19 also contains information on total ethanol consumption by different types of alcohol beverages (i.e., beer, wine, and liquor). When types of alcohol were compared, it appears beer was the predominant alcohol of choice among young males in

the military, followed by liquor and wine. Since the distribution of total ethanol content of all three types of alcohol was highly positively skewed, median statistics were also compared to determine the type of alcohol most consumed. Beer remained the most consumed alcohol, imbibed approximately three times more than liquor.

Alcohol-Related Consequences: Job Performance

As described in the previous chapter, alcohol-related consequences were measured by three indicators (i.e., job_con1, job_con2, and job_con3); these indicators also consisted of sets of survey items used to create each indicator for the latent construct. Table 18 shows the mean, standard deviation, skewness and kurtosis of the three index scores as well as each set of items that were measured by frequency of an event within the past 12 months and used for the computation. Overall, the sample reported an average of .03 incidents consequences related to personal health problems as a result of drinking, .51 for direct effects on job performance due to drinking, and .09 for consequences to respondents' military status as a result of drinking. Within those who reported to having one or more events in the areas of personal health problems that affected job performance as a result of drinking included: .3 percent got hurt in and on-the-job accident; .2 percent did not come to work at all because of a hangover, an illness, or a personal accident caused by drinking, was late for work, or left work early because of drinking, a hangover, or an illness caused by drinking; and .3 percent had an illness connected with their drinking that kept them from duty for a week or longer. In addition, having one or more events in terms of direct effects on job performance due to drinking were: 10 percent were late for work or left work early because of drinking, a hangover, or an illness caused by drinking; 15 percent worked below their normal level of

performance because of drinking, a hangover, or an illness caused by drinking; 6 percent were drunk while working; and 5 percent were called in during off-duty hours and reported to work feeling drunk. Furthermore, consequences to their work status as a result of drinking were composed of: 2 percent who didn't get promoted because of their drinking; 2 percent who got a lower score on their efficiency report or performance rating because of their drinking; and 4 percent who received UCMJ punishment because of their drinking. Although these percentages may seem small, out of a total of 178,817 young males in the military, these translate into a total of 3,576 young military personnel who report one or more incidents in at least one of the above categories related to the effects of drinking on job performance.

Bivariate Analyses

The bivariate relationships of the study variables including the five demographic variables are shown in Tables 20 and 21. Due to space considerations, the bivariate analyses are presented in two forms. Table 20 shows the bivariate relationships mainly between demographic variables and key indicator variables that construct the six latent variables. Table 21 shows the bivariate relationships between the major indicator variables.

Bivariate Relationships between Demographic Variables and Indicator Variables

Demographic Variables and Stress. Among relationships that were statistically significant, the most notable relationships were between service region and work stress experienced from insufficient training. More specifically, those stationed outside the United States (at the time of survey) were more likely to perceive stress due to lack of training related to their work than those stationed in the United States. In terms of family

stress, those who were married were more likely to experience family related stress. More specifically, significant relationships were found between marital status and four indicators of family stress (conflicts between individuals' military and family responsibilities; being away from family; divorce or breakup; and health problems of their family members). As anticipated, those who were stationed overseas (stationed outside the United States) were more likely to experience stress due to being away from family.

Demographic Variables and Impulsivity. Although the bivariate analyses between impulsivity and the demographic variables show weak relationships, there was a consistent pattern. For example, young males who were stationed outside the United States were more likely to show impulsiveness (on all five indicators). Moreover, the findings suggested that those who were unmarried and had less education were more likely to act impulsively compared to married personnel or those with a degree from some college or higher educational setting.

Demographic Variables, Drinking Motives, and Coping. Overall, the results indicated significant relationships between drinking motives and service region, marital status, and education level. Although the relationships are not strong, there does seem to be a pattern to the relationships. For example, young males stationed outside the United States, those who were unmarried, and those with less education were more likely to drink to forget about problems or to get in a better mood. In terms of coping, those with more education were more likely to use positive coping strategies than those with less education.

Table 20. Bivariate Correlation Matrix of Study Variables

Latent Variables	Indicators	Service Region (regional)	Race (nrace)	Marital Status (nmarstat)	Pay Grade (nenlist)	Education Level (Neduccat)
Work Stress	problems with coworkers (st_c)	-.05*	-.01	-.071**	.02	.04
	problems with supervisor(st_d)	-.06*	.02	-.05	-.00	.05
	concern about performance rating(st_e)	-.04	-.01	-.02	.02	.03
	increased work load (st_f)	-.02	.07**	.03	-.02	.03
	insufficient training(st_i)	-.12**	.02	.01	-.00	.01
Family Stress	conflicts between military and family (st_h)	-.01	-.01	.21**	.011	.03
	separation from family (st_j)	-.11**	-.04	.09**	.027	.05*
	death in the family (st_m)	-.01	-.05*	.01	.06*	.02
	divorce/breakup (st_n)	-.01	-.04	-.19**	.05*	-.00
	family health problems (st_r)	.02	-.04	.08**	.08**	.02
Impulsivity	act without stopping(rt_a)	-.07**	.03	-.03	.10**	.11**
	get a kick out from doing things dangerous (rt_b)	-.06*	.11**	-.10**	.00	.07**
	act impulsively (rt_c)	-.06*	.07**	-.05*	.06**	.08**
	do things chancy (rt_d)	-.05*	.04	-.09**	-.00	.07**
	hasty actions (rt_e)	-.11**	.02	-.07**	.06*	.08**
Drinking Motives	forget problems (mot_i)	-.07**	-.01	-.09**	.06*	.09**
	cheer up (mot_j)	-.07**	.01	-.07**	.05	.09**
Coping	positive coping (cope_pos)	.01	.02	-.01	-.09**	-.12**
Alcohol Use	total ethanol (alcohol)	-.07**	.05	-.04	.03	.06**
	drinking days (drn_days)	-.02	.09**	-.05	-.07**	.02
Alcohol-Related Consequenc-es	health (job_con1)	-.05	-.02	-.07**	.02	.03
	effects on job performance (job_con2)	-.02	-.01	-.10**	.05	.08**
	effect on military status (job_con3)	-.01	.01	-.09**	.05	.06*

Note: Correlations coefficients were rounded at the third decimal.
Control variables were dichotomized as follow: Regional: 1=within the United States, 0=outside the United States; Nrace: 1= nonHispanic White, 0=others; Nmarstat: 1= married, 0=unmarried; Nenlist: 1=enlisted, 0=officer; Neduccat: 1=high school or less, 0= some college or more.
** p< 0.01 (2-tailed); * p< 0.05 (2-tailed)

Demographic Variables Alcohol Use. The results showed that those stationed outside the United States were more likely to drink alcohol than those stationed within the United States The average amount of alcohol consumed was in fact, significantly higher for those stationed outside the United States compared to those stationed within the United States [$t(1,715) = -2.79$, $p<.01$]. When total amount of consumed alcohol was compared by region, those stationed outside the United States drank about one and a quarter times more (during the past 30 days) than those stationed within the United States Education level is another significant factor associated with drinking: those who had less education tended to drink more alcohol. An unanticipated correlation was that those in higher rank (pay group) drank more frequently (number of days drinking), but they consumed less alcohol in total. Education level was inversely related to total ethanol consumption; however, significant associations were not found between total ethanol consumption and race/ethnicity or marital status.

Demographic Variables and Alcohol-Related Consequences. Of all the demographic variables assessed in this study, marital status and education level seemed to have more significant associations with alcohol-related consequences (i.e., job performance). It bears repeating that the associations are weak, yet there also seems to be a pattern in the relationships between the three domains of consequences due to drinking and the demographic variables. Unmarried young males were likely to experience more alcohol-related consequences, i.e., poorer job performance, than those who were married. Moreover, those who had less education were likely to experience more frequent job performance problems.

Bivariate Relationships between Indicator Variables

Although direct effects of the latent variable are presented and discussed in the following SEM analyses section, the bivariate analyses results in Table 21 give a general idea of how the indicators are associated. Overall, the relationships between indicator variables showed statistically significant yet weak relationships. As noted previously in the preliminary analyses on the constructs of the latent variables, there were consistent significant bivariate correlations between indicators of each latent construct. Among the bivariate correlations, it was evident that most stress indicators were not directly associated with the quantity of drinking or the number of drinking days. Some indicators of family stress were positively related to quantity and days of drinking; however, they are not strongly associated as suggested in some studies of the direct relationship between stress and alcohol use. On the other hand, impulsivity showed stronger associations with drinking quantity and frequency (i.e., number of days) compared to stress factors. Notably, drinking motives (i.e., drinking to forget about problems or to enhance mood) showed stronger and statistically significant associations with drinking, which suggest that drinking motives contributes more to alcohol use than stress or impulsivity directly. Therefore, these results seem to support one of the research aims of this study which was to evaluate whether or not drinking motives mediate the relationship between stress, impulsivity, and alcohol use.

The relationship between coping and alcohol use showed that the more the young men use positive coping strategies, the less they drank in terms of both quantity and frequency. Overall, the more stress they experienced, the poorer the job performance. Likewise, the more impulsive they were, the poorer their job performance. Most notable

about the effects of alcohol use on job performance was that young men experienced more frequent incidents that people experienced directly related to job duty including being late for work, having hangovers or illnesses that kept people from performing at a normal level, or being drunk at work. This is also supported by the highest mean statistics of job_con2 among three indicators of alcohol-related consequences (i.e., job performance).

Table 21. Bivariate Correlation Matrix of Study Variables

Indicators	Work Stress (1-5)					Family Stress (6-10)					Impulsivity (11-15)					Motives		Coping	Alcohol Use		Consequences		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. st_c	-																						
2. st_d	.67**	-																					
3. st_e	.42**	.48**	-																				
4. st_f	.38**	.42**	.43**	-																			
5. st_i	.33**	.33**	.35**	.36**	-																		
6. st_h	.31**	.33**	.34**	.35**	.36**	-																	
7. st_j	.31**	.31**	.26**	.31**	.31**	.49**	-																
8. st_m	.13**	.14**	.18**	.15**	.18**	.27**	.25**	-															
9. st_n	.20**	.16**	.14**	.13**	.11**	.25**	.22**	.23**	-														
10. st_r	.24**	.20**	.23**	.24**	.21**	.35**	.33**	.36**	.17**	-													
11. rt_a	.23**	.19**	.12**	.16**	.14**	.16**	.14**	.10**	.10**	.11**	-												
12. rt_b	.14**	.09**	.05*	.08**	.10**	.06*	.05*	.04	.07**	.06*	.43**	-											
13. rt_c	.17**	.16**	.09**	.17**	.13**	.12**	.11**	.07**	.08**	.10**	.68**	.54**	-										
14. rt_d	.18**	.15**	.10**	.14**	.10**	.11**	.08**	.05*	.07**	.10**	.48**	.72**	.57**	-									
15. rt_e	.20**	.19**	.14**	.15**	.17**	.15**	.14**	.06*	.10**	.11**	.61**	.48**	.67**	.59**	-								
16. mot_i	.24**	.23**	.18**	.17**	.15**	.19**	.20**	.15**	.21**	.13**	.21**	.15**	.19**	.18**	.24**	-							
17. mot_j	.23**	.22**	.16**	.21**	.18**	.16**	.20**	.11**	.20**	.14**	.19**	.14**	.19**	.17**	.23**	.71**	-						
18. cope_pos	.09**	.05*	.08**	.12**	.10**	.09**	.13**	.07**	.10**	.10**	-.02	.05*	.01	.03	-.03	-.03	-.02	-					
19. alcohol	.06*	.08**	.02	.01	.03	.04	.06**	.09**	.07**	.05*	.19**	.21**	.17**	.20**	.18**	.24**	.27**	-.09**	-				
20. drn_days	.04	.06*	.02	.05	.02	.03	.05*	.04	.06**	.03	.16**	.18**	.17**	.16**	.17**	.25**	.28**	-.08**	.62**	-			
21. job_con1	.06**	.08**	.07**	.05*	.09**	.08**	.07**	.12**	.10**	.09**	.07**	.04	.05	.07**	.05*	.08**	.06*	.00	.08**	.05*	-		
22. job_con2	.17**	.17**	.09**	.11**	.14**	.10**	.12**	.11**	.11**	.12**	.16**	.18**	.17**	.19**	.19**	.23**	.25**	-.05	.31**	.31**	.27**	-	
23. job_con3	.04	.04	.07**	.02	.06*	.01	.06*	.06*	.04	.05	.08**	.06*	.06*	.07**	.07**	.12**	.13**	-.01	.09**	.07**	.23**	.20**	-

Note: Correlations coefficients were rounded at the third decimal.

Recoded variables represent as follow: st_c (stress from problems with coworkers); st_d (stress from problems with supervisor); st_e (stress from concern about performance rating); st_f (stress from increased work load); st_i (stress from insufficient training); st_h (stress from conflicts between military and family); st_i (stress from separation from family); st_m (stress from death in the family); st_n (stress from divorce/breakup); st_r (stress from family health problems); rt_a (act without stopping); rt_b (get a kick out from doing things dangerous); rt_c (act impulsively); rt_d (do things chancy); rt_e (hasty actions); mot_i (drink to forget about problems); mot_j (drink to cheer up bad mood); cope_pos (positive coping); alcohol (total ethanol during past 30 days); drn_days (drinking days during past 30days); job_con1 (health problems due to drinking effecting job performance); job_con2 (drinking having direct effects on job performance); and job_con3 (drinking effect on military status).

** p< 0.01 (2-tailed); * p< 0.05 (2-tailed)

Structural Equation Modeling Analyses

The results of the SEM analyses are presented in four mainly sections. The first presents the validation of the measurement model (Figure 9). The second presents the assessments of structural paths (or path coefficients) in terms of direct effects of each latent variable on other latent variables. Given that demographic variables (i.e., service region, race/ethnicity, marital status, pay grade, and education level) were controlled for in the analyses, path coefficients are shown but they are not explicitly discussed in the analyses. Instead, comparisons of the structural paths are made between models with and without control variables. The last two sections discuss the mediating effects of drinking motives and moderating effects of coping (i.e., positive coping), respectively.

Model Validation: Model Fit

Table 22. Results of Model Fit: CMIN, CFI, and RMSEA

Model	CMIN(χ^2)	d.f.	p	CMIN/d.f.	CFI	RMSEA
Default Model	755.041	271	.000	2.786	.962	.032

Table 22 shows the model (Figure 9) fits. CMIN (Chi-Square) and associated p-values were used to determine the overall model-fit which was calculated based on the degree to which the model does *not* match with the data, in other words, a non-significant Chi-square ($p>.05$) indicates a good fit. The results showed that assuming that the unconstrained model is correct, the probability of getting a model discrepancy or CMIN as large as 755.041 is .000 which is statistically significant (alpha set at the .05). Solely based on Chi-square statistics, the results indicate lack of satisfactory model fit. However, because Chi-square has its own issues related to making type II errors for

larger samples, this study used CFI and RMSEA as other two indices to determine the model fit. The present CFI value is .962 which exceeds .95, indicating that the hypothesized model adequately represents the latent constructs of work stress, family stress, impulsivity, drinking motives, alcohol use and alcohol-related consequences. The RMSEA value is .032 which also indicates a good fit (<.05). Therefore, it is fair to conclude that the measurement model fits the data well. A random of 50 percent of the sample was also selected and analyzed to provide statistical evidence to supplement the results. Results showed a consistent satisfactory model fit [(Model χ^2 (271) = 516.237, p<.01, CMIN/d.f.=1.905, CFI = .962, RMSEA = .032)].

Model Structure: Path Coefficients

When researchers speak of structural or path coefficients in SEM, they often refer to the standardized coefficients shown as 'standardized regression weights' in AMOS (7.0). The standardized regression coefficients of each path in the model are shown in the following Table 23 and Figures 10, 11, and 12.

Table 23 presents the effects of control variables on latent constructs. These findings are fairly consistent with the bivariate analyses reported in Table 20, though differences arise because Table 23 shows the associations between each control variable and each latent construct rather than with an each individual indicator of the latent variables. In terms of statistically significant relationships, young male military personnel stationed outside the United States were likely to experience greater work and family stress than those stationed within the United States. As anticipated, those who were married were likely to experience greater family stress than those who were unmarried.

Moreover, there were greater impulsiveness among those who were stationed outside the United States, nonHispanic White, unmarried, and in lower pay grades (i.e., rank), and had less education. Interestingly, officers were likely to consume more alcohol than those at enlisted ranks. Lastly, those who were not married were more likely to experience alcohol-related consequences, i.e., poorer job performance.

Table 23. Correlation Coefficients between the Control Variables and Latent Variables

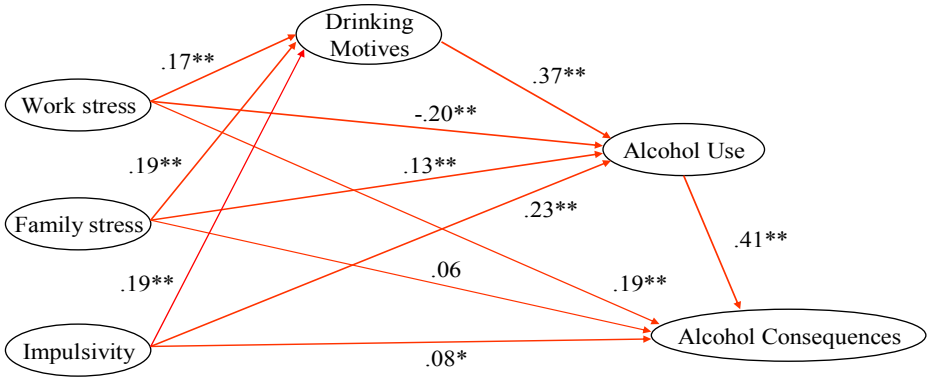
Control Variables	Work Stress	Family Stress	Impulsivity	Drinking Motives	Alcohol Use	Alcohol-Related Consequences
Service region (Regional)	-.08**	-.08**	-.09**	-.03	-.04	.04
Race/ethnicity (Nrace)	.03	-.04	.07*	.01	.06*	-.06
Marital status (Nmarstat)	-.01	.23**	-.06*	-.11**	-.05	-.12**
Pay grade (Nenlist)	-.01	.04	.06*	.03	-.05**	.04
Education level (Neduccat)	.05	.05	.09**	.05*	.01	.06

Note: Correlations coefficients were rounded at the third decimal.
Control variables were dichotomized as follow: Regional: 1=within the United States, 0=outside the United States; Nrace: 1= nonHispanic White, 0=others; Nmarstat: 1= married, 0=unmarried; Nenlist: 1=enlisted, 0=officer; Neduccat: 1=high school or less, 0= some college or more.
** p< 0.01 (2-tailed); * p< 0.05 (2-tailed)

Figure 10 presents the final structural model with standardized estimates of paths coefficients controlling for the five demographic variables (Model χ^2 (271) = 755.041, p<.01, CMIN/d.f.=2.786, CFI = .962, RMSEA = .032) while Figure 11 presents the structural model with standardized estimates of structural paths but without including the demographic variables in the analysis (Model χ^2 (192) = 556.680, p<.01,

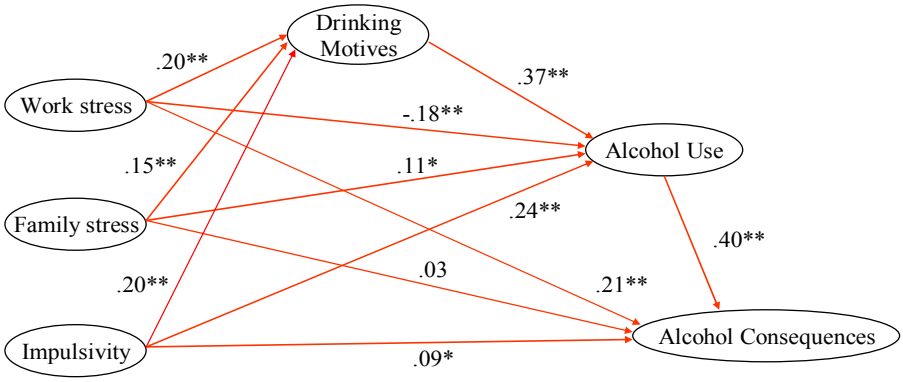
CMIN/d.f.=2.899, CFI = .970, RMSEA = .033). The two models were compared (see Figure 12) to assess the overall relationship patterns among latent variables. As Figure 10 shows, when controlling for service region, race, marital status, pay rank, and education level, most paths showed statistically significant relationships except for the non-significant associations between family stress and alcohol-related consequences. In addition, most structural paths showed positive relationships, meaning that the latent variables moved in the same direction, e.g., the higher the work stress, the greater their motives to drink (β=.17, $p<.01$). Additionally, the more young males gave reasons to drink to relax or to enhance mood, the heavier their alcohol consumption (β=.37, $p<.01$) leading to poorer job performance (β=.41, $p<.01$). Likewise, the greater the stress from family-related problems, the greater their motives to drink (β=.19, $p<.01$). Greater impulsiveness was also associated with greater motives to drink (β=.19, $p<.01$), consequently leading to higher alcohol consumption and poorer job performance. Even when the demographic factors were not controlled for as shown in Figure 11, the structural path coefficients of the model still produced consistent outcomes with those of the model with the controlling effects. Although the structural weights were slightly different in terms of the intensity of the relationships between the models with and without the effects of demographic factors, the alcohol use patterns were visibly similar (Figure 12).

Figure 10. Final Model Structure of Alcohol Use Patterns of Young Male Military Personnel Controlling for Demographic Variables



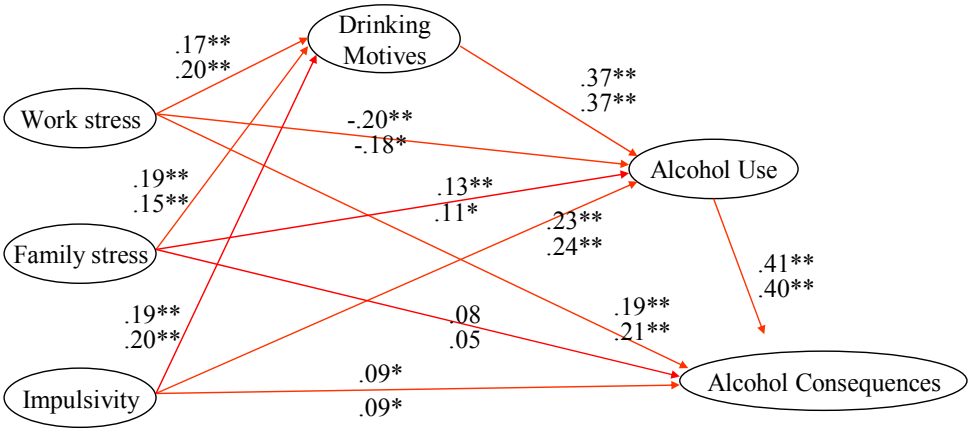
Note: standardized path coefficients (rounded at third decimal) are presented
** p< 0.01; * p< 0.05

Figure 11. Final Model Structure of Alcohol Use Patterns of Young Male Military Personnel Not Controlling for Demographic Variables



Note: standardized path coefficients (rounded at third decimal) are presented
** p< 0.01; * p< 0.05

Figure 12. Comparisons of Structural Weights with and without Control Variables



Note: Upper values present standardized path coefficients with control variables, and lower values present path coefficients without control variable
**p<.01; *p<.05

There were important findings of the analyses on the structural paths. For example, when controlling for service region, race, marital status, pay rank, and education level, significant direct associations were found between family stress on alcohol use (β=.13, p<.01) although relationships between family stress and alcohol-related consequences were not significant at the .05 level. It is also evident that stronger and statistically significant association is detected between family stress and drinking motives (β=.19, p<.01), and drinking motives and alcohol use (β=.37, p<.01), which may suggest an indirect relationship between family stress and alcohol use mediated by drinking motives. Thus, mediating effects of drinking motives were evaluated and are specifically discussed in the later parts of this chapter. The other important finding was the negative relationship between work stress and alcohol use (β=-.20, p<.01). Although

the direct association between work stress and alcohol use was weak, it does suggest that lower work-related stress (including interpersonal problems at work) was significantly associated with heavier alcohol consumption. In other words, the less work stress respondents experienced, the more they drank. This phenomenon was also found in the structural model without controlling for the demographic variables (β=-.18, $p<.01$).

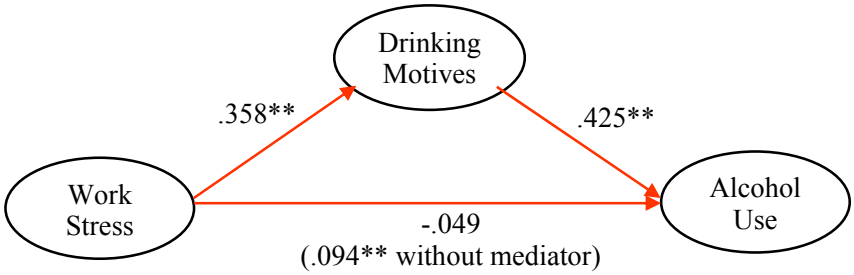
Mediating Effects of Drinking Motives

To evaluate the hypothesized mediating effects of drinking motives on work stress and alcohol use, family stress and alcohol use, and impulsivity and alcohol use, the bootstrapping method in AMOS (7.0) was used to calculate and analyze the total, direct, and indirect path coefficients between the variables of interest. Statistically significant mediation effects were detected based on the standardized correlation coefficients. The estimated indirect effects of drinking motives on the three relationships were also evaluated based on 95 percent confidence intervals as well as significance level (alpha set at the .01).

Mediation of Drinking Motives between Work Stress and Alcohol Use. Figure 13 shows the mediating model of work stress, drinking motives, and alcohol use and the direct effects of work stress and drinking motives on alcohol use. Results show that the estimated indirect effect (standardized) from work stress to alcohol use through drinking motives was .152 (cross-product term of .358 and .425). The 95 percent confidence intervals for the effect standardized indirect effect were between .114 and .196 with a p-value at .002 (<.01). Based on the results, it is fair to conclude that drinking motives had a statistically significant mediating effect on the relationship between work stress and alcohol use. In addition, because the direct relationship between work stress and alcohol

use is no longer statistically significant and the correlation coefficient is close to zero, the results support a full mediation model of drinking motives between work stress and alcohol use.

Figure 13. Mediation Model of Work Stress and Alcohol Use via Drinking Motives



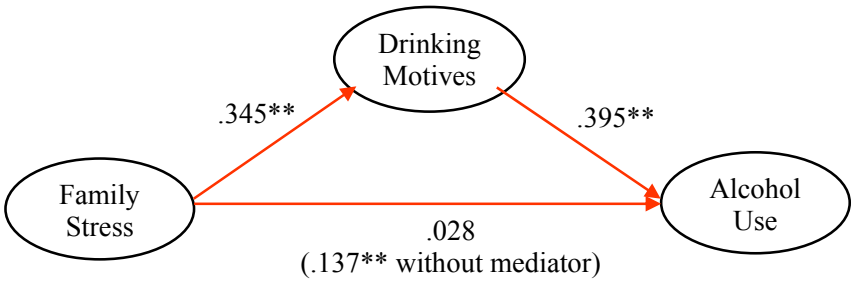
** p<.01; *p<.05

Mediation of Drinking Motives between Family Stress and Alcohol Use.

Figure 14 shows the mediating model of family stress, drinking motives, and alcohol use and the direct effects of family stress and drinking motives on alcohol use. The estimated indirect effect (standardized) from ‘family stress' to 'alcohol use' through ‘drinking motives'

was .136 (cross-product term of .345 and .395). The 95% confidence interval for the indirect effect was between .101 standardized and.179 with a p-value at .001 (<.01). Based on the results, it is fair to conclude that drinking motives had a statistically significant mediating effect on the relationship between family stress and alcohol use. Because the direct relationship between work stress and alcohol use is no longer statistically significant and the correlation coefficient is close to zero, the results support a full mediation model of drinking motives between family stress and alcohol use.

Figure 14. Mediation Model of Family Stress and Alcohol Use via Drinking Motives

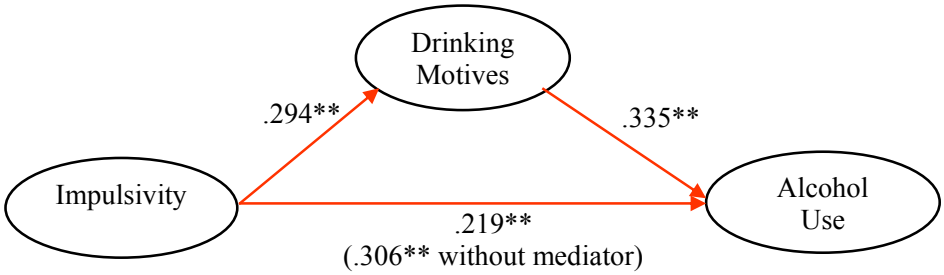


** p<.01; *p<.05

Mediation of Drinking Motives between Impulsivity and Alcohol Use

Lastly, Figure 15 shows the mediating model of impulsivity, drinking motives, and alcohol use and the direct effects of impulsivity and drinking motives on alcohol use. The estimated indirect effect from impulsivity to alcohol use through drinking motives was .99 (cross product term of .294 and .335). The 95 percent confidence intervals for the indirect effect were between .073 and .131 with a p-value at .002 (<.01). Based on the results, it is fair to conclude that drinking motives had a statistically significant mediating effect on the relationship between impulsivity and alcohol use. Unlike mediating effects of drinking motives on the relationship between stress and alcohol use, the findings support a partial mediation model of drinking motives between impulsivity and alcohol use. This is because the direct relationship between impulsivity and alcohol use remains statistically significant although the effect size decreased from .306 to .219.

Figure 15. Mediation Model of Impulsivity and Alcohol Use via Drinking Motives



** p<.01; *p<.05

Summary of Mediating Effects of Drinking Motives. Because there is a significant direct path detected between impulsivity and alcohol use, it can be concluded that drinking motives has partial mediation on the relationship between the two latent variables, provided that the indirect effect is itself significant. On the other hand, drinking motives showed to fully mediate the relationship between stress factors and alcohol use. In such cases, even if a direct relationship does not seem to exist between stress and alcohol use, it is suggested that the model include the direct path between the two latent variables in addition to the fully-mediated relationship in order to avoid biasing effects of not estimating the paths (Fletcher, 2006). In other words, the direct effect between stress and alcohol use, although non-significant or statistically significant but very weak in this case, are controlled for when included in the full structural equation model. The inclusion of the direct paths between stress factors and alcohol use is also important because the literature on alcohol research suggest that there is a strong associated between stress and drinking.

Moderating Effects of Positive Coping

Three key steps were taken in evaluating the moderating effects of coping. To test for moderation, SEM initially requires that the baseline model (same as the default single model) fits the data. Once it is determined that the model produces a good model fit, then the groups being compared (in this study, high and low coping groups defined by the coping variable) are tested for the same factor structure. This is determined by assessing the measurement weights (paths) which are then compared to the default baseline model. Finally, structural weights are compared to the baseline model to assess whether or not the two coping groups have statistically speaking, have the same factor structure and path coefficients. To indicate that there are significant moderating effects of coping, the CMIN (χ^2) difference [M2-M1] between the measurement model and the baseline model should not be statistically significant; this indicates that the model is applicable across groups. Moreover, to conclude that there are moderating effects of coping on the model, the CMIN (χ^2) difference [M3-M1] between the structural model and the baseline model should produce statistically significant results. Results of the measurement model are summarized in Table 24.

Table 24. Results of the Measurement Model

Model	CMIN (χ^2)	d.f.	χ^2/d.f.	CFI	RMSEA	$\Delta\chi^2$ (Δd.f.)	p
Baseline (M1)	862.648	542	1.592	.963	.022		.00**
Measurement (M2)	874.363	558	1.567	.963	.022		.00**
M2-M1						11.714 (16)	.76
Structural (M3)	913.833	559	1.526	.964	.022		.00**
M3-M1						51.184 (57)	.69

** p< 0.01 (2-tailed)

The null hypothesis for [M2-M1] was that there are no differences in paths between the high and low coping groups. The χ^2 difference between the baseline and the measurement model [M2-M1] was 11.714 with 16 d.f. and 16 parameters were not significantly different (alpha set at the .01) across the two coping groups (i.e., high and low). In other words, $\Delta \chi^2$ showed that the measurement model is invariant across groups, i.e., the model applies across groups. Since the results met the assumptions for moderation testing, the next step was to evaluate the χ^2 difference between the baseline and the structural model [M3-M1]. With χ^2 difference between the structural model and the measurement model being 51.184 with 57 d.f., the results showed that 57 parameters were not significantly different (alpha set at the .01) across the two coping groups. In other words, because the structural paths are statistically equal across groups, the results indicated that the structural model is invariant across groups. The results would have supported the moderation had there been statistically different structural paths between the two coping groups. However, the nonsignificance of the χ^2 difference between structural model and measurement model confirmed that there was no moderation effect of positive coping. The results from the holdout sample (randomly chosen 50% cases of the final sample) also showed consistent findings.

CHAPTER VI

DISCUSSIONS

While young adults are the predominant population in the U.S. military as well as being at higher risk for drinking vis-à-vis other populations, there is limited knowledge about drinking behaviors of the young military personnel. The primary aim of the study was to further the understanding of drinking patterns of young adults in the military by developing and testing a multivariate model of alcohol use with several key variables that have been widely discussed in alcohol research. More specifically, the proposed model included family and work stress factors as well as impulsiveness as key antecedents that may motivate alcohol use. The mediating effects of drinking motives were also assessed to determine whether or not a significant cognitive process may be involved in the decision to drink when people experience stress or are high impulsive. Furthermore, the effects of positive coping were examined for any moderating effects of coping on alcohol use. Although the variables included in the structural equation model were limited to those available through the 2005 DoD data set, findings support some of the study's the overall hypotheses. This section addresses key study findings and discusses them in the context of previous research on young adults' drinking. Limitations are also discussed, particularly in terms of using secondary data.

Significant Findings

The study findings showed that the proposed structural equation model showed a good fit. In general, controlling for service region, race/ethnicity, marital status, pay grade, and education level, greater impulsivity was associated with increased alcohol use. The present study also supports the hypothesized relationships between alcohol use and alcohol-related consequences. As seen in the final structural model of alcohol use patterns of young male military personnel, stress, impulsivity, and total alcohol consumption (i.e., both frequency and quantity of ethanol consumed) was significantly associated with alcohol-related consequences, particularly in terms of job performance.

However, contradictory to the literature supporting positive associations between stress and alcohol use, the relationship between work stress and alcohol use in the current study was negative though very weak while relationship between family stress and alcohol was positive yet very weak. The results from bootstrapping methods, however, may explain why the relationships between stress, impulsivity and alcohol use were significantly mediated through drinking motives (or reasons for drinking), hence the relationships between stress and alcohol use were non-significant after including the mediating variable, but their indirect effects through drinking motives were significant These mediating effects of drinking motives not only support the life stress paradigm Pearlin et al. (1981) suggested, but also Cox and Klinger's (1988) notion of motives providing a pathway to alcohol use and abuse. In other words, the effects of stress on alcohol use patterns are not as direct (parsimonious) as Conger (1956) suggested; rather, the course of decision making into drinking is more complicated. Therefore, this study's findings on mediation support the considerable body of literature indicating the important

mediating role of motives in those who consume alcohol. They are also consistent with studies that suggest the importance of perception or the anticipatory benefits that people develop as a result of drinking which also affects their future drinking behaviors (Brown, 1985; O'Hare, 1990; Harris & Fennell, 1988; Cooper et al., 1995; Tran et al., 1997). This is very similar to suggestions about the effects of human cognition on alcohol use that process drinking as a pleasurable experience; hence, positive alcohol expectancies are learned behaviors (Houghton & Roche, 2001; McNeece & DiNitto, 2005). Although the amount of stress young military personnel experience is important in understanding their alcohol use patterns, it may be more important to address the ways individuals deal with stress so as to help them decrease the motivation to drink when faced with stressful events.

In addition to the mediating effects of drinking motives, another way to understand the nonsignificant relationships between stress and alcohol use is the stress-buffering role of coping that researchers suggest moderates the effects of stressful experiences on drinking (Lazarus & Folkman, 1984; Cooper et al., 1988). The literature on coping has mostly focused on negative coping strategies or avoidant coping mechanisms in determining its effects on alcohol use (Cooper et al., 1992). This study, however, tested the moderating effects of positive coping only and did not test negative coping due to a possible confound between one of the study's outcome variables, alcohol use, and of one of the two indicator items that were available to measure negative coping. More specifically, this indicator measured the frequency of "having a drink" as a method to coping with pressure, stress, depression, and anxiety. In other words the model could not be tested if one of the

indicator variables was the frequency of drinking and one of the outcome variables was also frequency of drinking. In the current study drinking was specified as an outcome variable. Therefore, a multiple group analysis in AMOS (7.0) was used to determine the moderating effects of positive coping but identifying those in high and low coping scores. The results showed that although the model shared the same factor structure between the high and low coping groups, the level of positive coping did not moderate the influence of stress and impulsivity on alcohol use and alcohol-related consequences. Although coping, in general, is suggested to be an internal process in efforts to decrease stress (Folkman et al., 1986), most studies have focused on ineffective or negative coping (Brown et al., 1995; McEwan & Sapolsky, 1995; Rice, 1999; Stewart, 2000). In the current study, which focused on positive coping, results indicate that this does not play a significant role in reducing alcohol consumption. As Heany et al. (1995) and Rice's (1999) health outcome perspective suggests, the effectiveness of coping depends on individuals' selection of coping strategies. It may also be reasonable to conclude that positive coping does not moderate the relationship between stress and alcohol use because alcohol use has long-range repercussions on stress despite its temporarily effect on regulating negative emotions (Wood et al., 1992; Ruzek et al., 2007). Therefore, although it is disappointing that the study's findings failed to show moderating effects of coping on the alcohol use patterns and its related consequences, it is also not surprising.

As discussed extensively in the literature review, the current study verified the importance of understanding the developmental traits, i.e., impulsivity, of young adults. Impulsivity was hypothesized to be positively associated with increased alcohol use,

which consequently results in lowered job performance. Consistent with numerous studies (Little, 2000; Simons, 2003; Benton et al., 2006), in the current study, impulsivity significantly contributed to drinking motives, alcohol use and alcohol-related consequences. Moreover, drinking motives significantly mediated the relationship between impulsivity and alcohol use. This mediation effect can be understood in terms of impairment in the decision-making processes, particularly lack of control over impulsiveness, which is often seen in people who drink excessively (Bechara et al., 2001).

Although used as control variables, some bivariate relationships between demographic variables and the indicators of key latent variables are noteworthy. As anticipated, young males stationed outside the United States at the time of survey were significantly more likely to perceive work stress such as lack of training and family stress as a result of separation from family members. These results resonant with a recent report on regional differences in alcohol use among U.S. military personnel that found military personnel stationed outside the United States are more likely to consume alcohol, especially those stationed in Asia (Bray et al., 2005). In terms of marriage status and stress experience, married respondents were more likely to experience family stress due to conflicts between their military and family responsibilities, being away from family, divorce or break up, and health problems of their family members. Furthermore, the findings are consistent with existing research on the associations between marital status and engagement in risky behaviors (Bachman et al., 1997; Baer, 2002). This study showed that those who were unmarried and had less education were more likely to act impulsively compared to married personnel or those who had some college or more

education, respectively. However, contrary to studies that find that marital status is directly related to increased drinking (Bachman et al., 1997; Wood et al., 2001; Baer, 2002), the current study showed that marital status is a significant predictor of poorer job performance due to drinking, not quantity or frequency of drinking.

The unexpected finding of a negative relationship between work stress and alcohol use, results in a number of different strategies to explain this inconsistency with previous studies. One method was to compare the relationship between work stress and alcohol use independently with AMOS (7.0) to examine changes in the standardized regression weights before and after adding the mediating variable, drinking motives. This approach was based on the assumption that a mathematical process in SEM could have been involved in the change of the path coefficients between work stress and alcohol use, not the nature of the relationship itself. The statistical findings showed that by adding the mediating variable (i.e., drinking motives) to the relationship between work stress and alcohol use, the path coefficients changed from a very weak positive one (β=.094**, $p<.05$) to a very weak negative one (β=-.049). A possible reason may that stronger paths exists between work stress and drinking motives, and drinking motives and alcohol use, that in total exceed the fixed magnitude between work stress and alcohol use. Consequently, the path coefficient between work stress and alcohol use could have been mathematically adjusted by over-compensating the relationships as a result of statistical modeling, thus, pulling the relationship to the negatives and producing a very weak negative effect.

Another way of explaining the unexpected negative relationship between work stress and alcohol use might be that those in high stress jobs would not be able to do their

work if they drank too heavily. Or, military personnel who were more educated or less impulsive could have been selected, consciously or unconsciously, for high stress duty. In other words, those who drink too much might be ruled out for high stress jobs. Therefore, demographic comparisons between high and low work stress groups were sought; however, significant differences were not found between the groups in terms of age groups, marital status, or education level. To see if impulsivity matters in terms of the relationship between work stress and alcohol use, high and low impulsivity groups were created and compared on the correlation coefficients between work stress and alcohol use. Both groups showed negative paths between work stress and alcohol use, thus ruling out this explanation. An alternative way to think about the issue is that heavy drinkers who have already reached a certain level of drinking may drink regardless of their stress level. At the point at which people developed alcohol abuse or dependence, their drinking may be less stress-related and more related to the need to sustain drinking levels. However when heavy drinkers and non-heavy drinkers were compared on path coefficients between work stress and alcohol use, statistically significant differences were not found and the negative sign of the relationship did not change. Therefore, based on various attempts to account for the negative relationship between work stress and alcohol use, the mathematical correction seems the most compelling argument at this juncture.

Lastly, the study explored and compared the respondents who were included the analysis ($SD \leq 4$) and those who were excluded as outliers ($SD > 4$). Demographically, the two groups (cases included in the analysis and cases that were selected out from the analysis) showed similarities in terms of service region and marriage status: about half of the respondents were stationed within the United States, and majority of them were not

married (63%). However, it appears that the two groups differ to some extent. Respondents who were excluded from the analysis, due to being outliers, were more likely to be Whites and less educated (high school or less) than those who were included in the analysis. Moreover, those in the outlier group reported to have been more frequently deployed within the past 3 years than those included in the analysis (64% vs. 61%). More specifically, outliers were 6 percent more deployed for the first time during the past 3 years than those included in the analysis (43% vs. 37%). In terms of changes in their alcohol consumption before and after joining the military, respondents in the outlier group were about twice as those included in the analysis to report increase in their drinking (79% vs. 32%). Although it may be reasonable to think that religiosity is likely to be associated with abstinence or less drinking, results show that approximately 79 percent of outliers and 65 percent of non-outliers agreed or strongly agreed that religious/spiritual beliefs are a very important part of their life. In addition, 71 of outliers and 54 percent of non-outliers also agreed or strongly agreed that their religious/spiritual beliefs influence how they make life decisions. Furthermore, about 21 percent of those in the outliers reported to have had a suicidal ideation compared to 16 percent of respondents included in the analysis. Most particularly, respondents in the outlier group were more likely to show higher impulsivity in the five domains of impulsivity measurement. They also showed higher motivation to drink. In fact, respondents in the outlier group were 3 to 4 times more likely to have strongly agreed that they drink in order to forget about their problems or enhance their mood. Nonetheless, it is also important to note that the overall model-fit as well as path coefficients change very little between before and after excluding the outliers.

Limitations

Understanding Data Choices and Characteristics

The use of a secondary data set offered both strengths and limitations for the study. U.S. military bases are located in various regions including Europe and Asia. Therefore, the availability of a public use file for the most recent data set on health behaviors of military personnel made the current study feasible as well as extremely economic because the costs associated with collecting data directly from a representative sample have already been borne. The main drawback of the secondary data was that the survey items were not designed to answer the specific research questions of the current study. Due to limitations in the availability of survey items, they impacted on the development of key constructs other than those used in the current study that may have potentially been useful in promoting a better understanding of alcohol use patterns of young adults. Hence, the quality of the research depended on the information provided in the secondary data set, such as the accuracy as well as sufficiency of measurements, especially in terms of the degree to which the indicator items clearly measure the core concept of each latent variable specified in the current study. Therefore, various data reduction strategies as well as reliability analyses were conducted in extracting the necessary information to establish a maximum fit, internal consistency, and operationalization of each latent structure. In addition, one of the important latent variables of the study was dropped prior to the finalization of the structural model. More specifically, due to the insufficient number of indicator variables to compose a negative coping variable, the moderating effects of coping was examined only in terms of positive coping. Knowing that people in general use both coping strategies (i.e., positive and

negative), the inclusion of negative coping may have produced more nuanced or satisfactory findings.

Another major shortcoming of using the 2005 DoD data set was the exclusion criteria that were applied in the survey administration, thus, limiting the generalization of the study findings to the entire young military population. Not being able to measure stress, impulsivity, and alcohol use among young military personnel at war or those who may be undergoing transitional process after an immediate return from combat experience may alter the true picture of alcohol use patterns of U.S. military personnel. In fact, alcohol use has been reported to be highly associated with PTSD or depression. Therefore, the current findings should be generalized only to the population of those included in the survey. Moreover, because the survey was based on self-reported measurements, the findings could also underestimate or even overestimate the accuracy of drinking patterns.

Understanding SEM

Although significant relationships were found between study variables, results should be interpreted with caution. This is because a structural equation model is not intended to distinguish causal relationships, rather possible causality of the relationships among the variables in the model is based on literature reviews and relevant theories that support the direction of such relationships. The structural model of the current study was based on extensive literature. The latent constructs were established based on survey items that specifically inquire about the conceptualization that follows a sequential order in terms of the associations between the latent variables. Therefore, it does seem

reasonable to discuss the causal order between stress, impulsivity, drinking motives, alcohol use, and alcohol-related consequences.

Implications for Future Research and Policy

This study suggests various directions for future research and policy. The focal point of the current study was on developing a structural equation model with particular emphasis on individual characteristics in predicting alcohol use patterns. However, like adults, young people's alcohol consumption is also affected by their environment and the accessibility of alcohol beverages. Therefore, the findings provide an opportunity to further think about the physical and psychological contexts of military drinking especially in relation to perceived drinking norms as well as inconsistencies in the military regulations on minimum drinking age because ambivalent messages can be delivered to and perceived by young military personnel as "acceptable" in regards to their life styles involving alcohol.

Any extension of the current study may incorporate environmental factors that are associated with alcohol availability to the existing model of alcohol use patterns of young military personnel. Alcohol availability refers to both legal or physical accessibility as well as individuals' perceived accessibility of alcohol. Legal accessibility may include regulations on military minimum drinking age, alcohol pricing, and physical alcohol availability in and outside military bases. While individuals' perceived accessibility includes peer influences and perception of drinking norms in the military. These have been suggested as important factors in understanding the drinking contexts of young people (Gruenewald & Millar, 1993; Ames & Grube, 1999; Frone, 1999; Bachman et al., 1997; Borsari & Carey, 2001; Andrews et al., 2002; Perkins, 2002; Presley et al., 2002;

McNeece & DiNitto, 2005). Future studies can more comprehensively examine by environmental aspects of risk and protective factors to address enabling and reinforcing effects on the establishment of young adults' perceptions about drinking as well as quantity and frequency of alcohol use.

Another important consideration for future research is the assessment of moderating effects of negative coping. Due to the fact that the current study was unable to operationalize negative coping, it is recommended that surveys on health behaviors include detailed questionnaires on negative coping or perhaps incorporate some of the key survey items similar to those in standardized measurement instruments on coping to be able to assess various aspects of coping strategies, both positive and negative. Moreover, the measures of negative coping methods should include items other than drinking to avoid possible confounds with alcohol use.

A longitudinal study is also recommended to assess any changes in alcohol use patterns over time with length of stay in the military and different phases of military involvement as well as maturity in terms of passing through young adult life stages (O'Malley, 2005; Jackson et al., 2001). Such studies may specifically examine differences in the alcohol use patterns among young adults related to their pre-and post combat experience(s) and/or overseas deployment experience(s) that induce distress and consequently induce stronger needs to cope. This is important because military personnel with deployment experience(s) tend to exhibit higher alcohol use rates than the non-deployed (Federman et al., 2000; Bray et al., 2005). Combat exposure can also elevate risk for mental health problems such as PTSD, depression, and anxiety (Hoge, Terhakopian, Castro, Messer, & Engel, 2007). For example, Killgore et al. (2008)

recently conducted a study on the effects of combat experiences on propensity for risk-taking behaviors, quantity of alcohol use, and displacement of aggression towards others. The Combat Experiences Scale (CES), which targets respondents' combat-related experiences by including detailed descriptive survey items that explicitly illustrate their war experiences, was used as the major assessment tool. Upon surveying U.S. soldiers who returned from their 12-month combat mission in Iraq in 2006, their findings suggested that greater exposure to combat experiences predicted risk-taking behaviors including alcohol use at increased frequency and quantity. More specifically, exposure to violent combat and having direct responsibility for taking the life of another person were associated with increased propensity for risk-taking (Killgore et al., 2008). Therefore, integrating factors related to combat experience will further the knowledge of alcohol use patterns among young military personnel.

While the present study focused mainly on young males' alcohol use patterns, future research should also expand on the findings by testing the model with young females in the military. Women's drinking behaviors are different than men's due to gender disparities in alcohol metabolism, effects of alcohol, and reasons for drinking such as different stress factors, history of physical and sexual abuse, intimate partner violence, and experience of co-occurring disabilities (Nelson-Zlupko et al., 1995; Covington, 2002; Davis & DiNitto, 2005). The goal of taking such approach is not only gender sensitivity in conducting alcohol research; it may also provide a foundation for developing a universal model of alcohol use patterns.

On the whole, substance abuse has become an important area of research and policy not only because of the growing needs for effective treatment programs, but also

the costs involved in treating substance abuse. The U.S. military system has continued to respond to the increasing alcohol use among military personnel. One of many ways is the provision of professional mental health services to meet the demands of military personnel and their families. These service include psychoeducational trainings such as anger and stress management sessions or suicidal awareness programs, individual and group counseling, marital counseling, family therapy, and combat stress debriefings (Fenell & Fenell, 2003), to name a few. Minimum drinking age policy has also evolved to address concerns about the safety and increasing alcohol-related incidents of young military personnel.

Nonetheless, alcohol use remains a considerable issue in the military. In fact, heavy alcohol use increased between 2002 and 2005, while it decreased in the civilian population during the same time period. Therefore, a structural change may be necessary to facilitate and promote healthier life styles of young military personnel. Because the amount of alcohol consumed significantly affects job performance, management should institute changes on alcoholic beverage purchases by eligible military ID card holders at duty-free Post Exchange (PX) shops located on military bases. However, it may be impossible to track young adults' alcohol consumption during off-duty hours at local bars located outside their military base. Therefore, more fundamental strategies such as change in attitude toward drinking, as well as new alternative recreational activities, other than drinking, are needed to prevent young people from putting their and others' lives at risk and to meet the demands of young adults' various developmental needs.

Implications for Practice

The current study supports the importance of understanding the motives for alcohol use as suggested by numerous previous studies (Brown, 1985; Cox & Klinger, 1988; Harris & Fennell, 1988; O'Hare, 1990; Cooper et al., 1995; Tran et al., 1997). The findings demonstrate the significant indirect effects of drinking motives on the relationship between stress, impulsivity, and alcohol use. Alcohol use also resulted in notably poorer job performance. The findings of this study can be incorporated into the alcohol prevention and treatment program designs that emphasize the impulsivity component of young adults. It is less likely for young people to abstain from problematic drinking as a result of alcohol prevention education because they are in the process of passing through the important life stages where they tend to explore identity and seek sensation through experiencing various stimulations that involve risky behaviors. Therefore, innovative ideas can add to the current alcohol treatment programs such as adopting impulsivity measures to incorporate an understanding of the potential benefit of considering the impulsivity factor in successful treatment settings. It may be also important to understand the role of alcohol use experiences in the development of heightened impulsivity possibly as a result of sensitization through reinforcements (learned behaviors) that young people receive through drinking. Therefore, professionals working with young adults may improve the quality of care by understanding the fundamental psychological processes of drinking mechanisms.

The present model can also be directly used in alcohol treatment plans of young military personnel as a means to validate the model. From a strengths perspective, these factors can also be used as protective factors integrated in frequent assessments on young

peoples' psychological health state to identify early warning signs of problematic alcohol use. In addition, clinical programs can respond effectively to the needs of young soldiers and their family members by focusing on the stress involved in transitional periods in the early phases of military entry and/or reunion processes after young military personnel's experience from dangerous training and duties, frequent deployments, and separation from family members to be able to deter drinking motives as a means of dealing with stress. The ultimate goal of taking these steps is to effectively address the mental and physical health needs of young military personnel (as well as their family members) during military service.

CONCLUSIONS

The present study attempted to illuminate alcohol use patterns of young males in the U.S. military. The study's several strengths include the use of sophisticated analytic strategies in establishing a complex model based on a large sample size and its identification of opportunities for early interventions to promote healthier lifestyles of young military personnel. The proposed model showed good model-fit as well as statistically meaningful associations between the latent variables. Particularly, the verification of the mediating role of drinking motives not only replicates findings of previous research, but also demonstrates the importance of the need to strategically target the psychological processes of drinking in designing more effective alcohol prevention programs and treatments in the military. The major focus was on assessing alcohol use patterns of young males based on their characteristics, especially psychological and developmental aspects. Therefore, it is important to understand that the weak relationships between stress and alcohol use in the present study by no means imply that stress experienced by young male military personnel is not important in predicting alcohol use. The findings suggest that understanding drinking patterns from a more holistic point of view involving the consideration of complex cognitive processes that result in alcohol use is critical. Moreover, because alcohol use are significantly more prevalent among young military personnel compared to same-age civilians, this study also suggests that preventive education on impulsivity control also begins for young military personnel in the early transition phases of joining the military .

Appendix

Descriptions of Variable Constructs

Descriptions of Variable Constructs

I. Independent latent variables:

1. Work stress

Recoded (Original) Indicators	Descriptions: During the past 12 months, how much stress did you experience from each of the following?	Recoding Instructions (Original Descriptions)
st_c (Edq92c)	Problems in my relationships with the people I work with.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: a lot)
st_d (Edq92d)	Problems in my relationship with my immediate supervisor(s).	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: a lot)
st_e (Edq92e)	Concern about my performance rating.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: a lot)
st_f (Edq92f)	Increases in my work load.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: a lot)
st_i (Edq92i)	Insufficient training.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: a lot)

2. Family stress

Recoded (Original) Indicators	Descriptions: During the past 12 months, how much stress did you experience from each of the following?	Recoding Instructions (Original Descriptions)
st_h (Edq92h)	Conflicts between my military and family responsibilities.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: a lot)
st_j (Edq92j)	Being away from my family.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: a lot)
st_m (Edq92m)	Death in the family.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: a lot)
st_n (Edq92n)	Divorce or breakup.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: a lot)
st_r (Edq92r)	Health problems that my family members had.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: a lot)

3. Impulsivity

Recoded (Original) Indicators	Description: Please indicate how much each statement below describes you.	Recoding Instructions (Original Descriptions)
rt_a (Edq15a)	I often act on the spur of the moment without stopping to think.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: quite a lot)
rt_b (Edq15b)	I get a real kick out of doing things that are a little dangerous.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: quite a lot)
rt_c (Edq15c)	You might say I act impulsively.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: quite a lot)
rt_d (Edq15d)	I like to test myself every now and then by doing something a little chancy.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: quite a lot)
rt_e (Edq15e)	Many of my actions seem to be hasty.	1=1; 2=2; 3=3; 4=4 (1: not at all; 2: a little; 3: some; 4: quite a lot)

II. Mediating variable

1. Motives (for drinking) [motives]

Recoded (Original) Indicators	Description: Please tell us how important each reason is to you, for your drinking.	Recoding Instructions (Original Descriptions)
mot_i (Edq40i)	To forget about your problems.	1=0; 2=0; 3=1; 4=2 (1: don't drink; 2: not at all important; 3: somewhat important; 4: very important)
mot_j (Edq40j)	To cheer up when you're in a bad mood.	1=0; 2=0; 3=1; 4=2 (1: don't drink; 2: not at all important; 3: somewhat important; 4: very important)

III. Moderating variable

1. Coping [coping]: mean of (c1, c4, c5, c6, c7, c9)

Recoded variable	Recoded (Original) Items	Description: When you feel pressured, stressed, depressed, or anxious, how often do you engage in each of the following activities?	Recoding Instructions (Original Descriptions)
Cope_pos	c1 (Edq93a)	Talk to a friend or family member	1=1; 2=2; 3=3; 4=4 (1: never; 2:rarely; 3: sometimes; 4: frequently)
	c4 (Edq93d)	Say a prayer	1=1; 2=2; 3=3; 4=4 (1: never; 2:rarely; 3: sometimes; 4: frequently)
	c5 (Edq93e)	Exercise or play sports	1=1; 2=2; 3=3; 4=4 (1: never; 2:rarely; 3: sometimes; 4: frequently)
	c6 (Edq93f)	Engage in a hobby	1=1; 2=2; 3=3; 4=4 (1: never; 2:rarely; 3: sometimes; 4: frequently)
	c7 (Edq93g)	Get something to eat	1=1; 2=2; 3=3; 4=4 (1: never; 2:rarely; 3: sometimes; 4: frequently)
	c9 (Edq93i)	Think of a plan to solve the problem	1=1; 2=2; 3=3; 4=4 (1: never; 2:rarely; 3: sometimes; 4: frequently)

IV. Outcome variables:

1. Alcohol use: will be measured by 'alcohol' and 'drn_days'

(1) [alcohol] = 'beer' + 'wine' + 'liquor'

a. First, all three types of alcohol will be computed by ethanol consumption so that it make a comparative measure. Based on beer 12oz= wine 4oz= liquor 1.5oz (ethanol %)

(1) Beer calculation: [beer]= edq18*edq19*edq20

Recoded (Original) Item	Recoding Instructions	Recoded (Original) Item	Recoding Instructions	Recoded (Original) Item	Recoding Instructions
Beer1 (Edq18) : During the past 30 days, on how many days did you drink beer?	# of days (avg.) 1=0 2=1 3=2.5 4=7 5=15 6=23.5 7=29	Beer2 (Edq19) : During the past 30 days, what size cans or bottles of beer did you usually drink?	Size in oz. 1(8oz)=.67 2(12oz)=1 3(16oz)=1.33 4(32oz)=2.67 5(40oz)=3.33 6(some other)= (2.00: avg. substitute) 7(don't drink) =0	Beer3 (Edq20) : During the past 30 days, how much beer did you usually drink on a typical day when you drank beer?	# beers 1=0 2=1 3=2 4=3 5=4 6=5 7=6 8=7 9=8 10=10 11=13 12=16 13=18

(2) Wine calculation: [wine]= edq21*edq22*edq23

Recoded (Original) Item	Recoding Instructions	Recoded (Original) Item	Recoding Instructions	Recoded (Original) Item	Recoding Instructions
Wine1 (Edq21) : During the past 30 days, on how many days did you drink wine? Note: regular wine (12%), fortified wine (17- 21% =avg. 19%), wine cooler (4-6%= avg. 5%)	# of days (avg.) 1=0 2=1 3=2.5 4=7 5=15 6=23.5 7=29	Wine2 (Edq22) : During the past 30 days, did you usually drink a regular wine or a fortified wine?	Type of wine 1(regular)=1 2(fortified)=1.58 3(winecooler)=.42 4(didn't drink)=0	Wine3 (Edq23) : During the past 30 days, how much wine did you usually drink on a typical day when you drank wine?	#wine glasses 1=0 2=1 3=2 4=3 5=4 6=5 7=6 8=7 9=8 10=10 11=12

(2) Liquor calculation: [liquor]= edq24*edq25*edq26

Recoded (Original) Item	Recoding Instructions	Recoded (Original) Item	Recoding Instructions	Recoded (Original) Item	Recoding Instructions

Liquor 1 (Edq24) : During the past 30 days, on how many days did you drink liquor?	# of days (avg.)
	1=0
	2=1
	3=2.5
	4=7
	5=15
	6=23.5
	7=29
		Liquor2 (Edq25) : During the past 30 days, about how many ounces of liquor did you usually have in your regular drink?	Size in oz
			1(didn't drink)=0
			2(1oz)=.67
			3(1.5oz)=1
			4(2oz)=1.33
			5(3oz)=2
			6(4oz)=2.67
			7(5+oz)=3.33
				Liquor3 (Edq26) : In the past 30 days, how much liquor did you usually drink on a typical day when you drank liquor?	# drinks
					1=0
					2=1
					3=2
					4=3
					5=4
					6=5
					7=6
					8=7
					9=8
					10=10
					11=13
					12=16
					13=18

b. 'alcohol' was then computed by: [beer] + [wine]+ [liquor] which represent average ethanol consumption in 30 days.

(2) [drn_days]= edq16 recoded

Recoded (Original) Indicators	Description	Recoding Instructions (Original Descriptions)
Drn_days (Edq16)	During the past 30 days, on how many days did you drink alcohol?	1=0; 2=1; 3=2.5; 4=7; 5=15; 6=24; 7=29 (1: didn't drink; 2; once; 3: 2-3days; 4: 4-10days; 5: 11-19days; 6: 20-27days; 7: 28-30days)

2. Alcohol-related consequences: measured by job performance 'job_con1,' 'job_con2,' and 'job_con3'

- **a.** [job_con1] = b1+b3+b9
- **b.** [job_con2] = b2+b4+b5+b6
- **c.** [job_con3] = b7+b8+b10

Recoded Indicator	Recoded (Original) Items	Descriptions: In the past 12 months,	Recoding Instructions (Original Descriptions)
Job_con1	b1 (Edq36a)	I was hurt in an on-the-job accident because of my drinking.	1: don't drink; 2: none; 3: 1; 4; 2+ (1=0; 2=0; 3=1; 4=2)
	b3 (Edq36c)	I did not come to work at all because of a hangover, an illness, or a personal accident caused by drinking.	1: don't drink; 2: none; 3: 1; 4; 2+ (1=0; 2=0; 3=1; 4=2)
	b9 (Edq37c)	I had an illness connected with my drinking that kept me from duty for a week or longer.	1: don't drink; 2: none; 3: 1; 4; 2; 5:3+ (1=0; 2=0; 3=1; 4=2)
Job_con2	b2 (Edq36b)	I was late for work or left work early because of drinking, a hangover, or an illness caused by drinking.	1: don't drink; 2: none; 3: 1; 4; 2+ (1=0; 2=0; 3=1; 4=2)
	b4 (Edq36d)	I worked below my normal level of performance because of drinking, a hangover, or an illness caused by drinking.	1: don't drink; 2: none; 3: 1; 4; 2+ (1=0; 2=0; 3=1; 4=2)
	b5 (Edq36e)	I was drunk while working.	1: don't drink; 2: none; 3: 1; 4; 2+ (1=0; 2=0; 3=1; 4=2)
	b6 (Edq36f)	I was called in during off-duty hours and reported to work feeling drunk.	1: don't drink; 2: none; 3: 1; 4; 2+ (1=0; 2=0; 3=1; 4=2)
Job_con3	b7 (Edq37a)	I didn't get promoted because of my drinking.	1: don't drink; 2: none; 3: 1; 4; 2; 5:3+ (1=0; 2=0; 3=1; 4=2)
	b8 (Edq37b)	I got a lower score on my efficiency report or performance rating because of my drinking.	1: don't drink; 2: none; 3: 1; 4; 2; 5:3+ (1=0; 2=0; 3=1; 4=2)
	b10 (Edq37d)	I received UCMJ punishment (Court Martial, Article 15, Captain's Mast, Office Hours) because of my drinking.	1: don't drink; 2: none; 3: 1; 4; 2; 5:3+ (1=0; 2=0; 3=1; 4=2)

V. Control Variables: control variables were all recoded variables into dichotomized variables

Recoded (Original) Variable	Descriptions	Recoding Instructions (Original Descriptions)
Regional (Conus)	Region of Installation	1:conus; 0: oconus (1: conus-within the United States; 2:oconus-outside the United States; 3:afloat)
Nrace (Race_eth)	Race/Ethnicity	1: nonhispanic White; 0: other (1: Nonhispanic White; 2: Nonhispanic Black; 3: Hispanic; 4: Other)
Nmarstat (marstat)	Marriage Status	1: married; 0:unmarried (1: married, unknown; 2: unmarried)
Nenlist (enlist)	Pay Grade Class: Enlisted or Officer	1:enlisted; 0:officer (1: enlisted; 2:officer)
Neduccat (educcat)	Education Level	1:high school or less; 0: some college or more (1: high school or less; 2: some college; 3: college degree or more)

REFERENCES

Abbey, A., Saenz, C., & Buck, P. O. (2005). The cumulative effects of acute alcohol consumption, individual differences and situational perceptions on sexual decision making. *Journal of Studies on Alcohol, 66*(1), 82-90.

Abrams, D. B., & Niaura, R. S. (1987). Social learning theory. In H. T. Blane & K. E. Leonard (Eds.), *Psychological theories of drinking and alcoholism* (pp. 131-178). New York: Guilford Press.

Ames, G. M., & Cunradi, C. (2004). Alcohol use and preventing alcohol-related problems among young adults in the military. *Alcohol Research & Health, 28*(4), 252-257.

Ames, G. M., & Grube, J. W. (1999). Alcohol availability and workplace drinking: Mixed method analyses. *Journal of Studies on Alcohol, 60*(3), 383-393.

Ames, G. M., & Janes, C. A. (1992). A cultural approach to conceptualizing alcohol and workplace. *Alcohol Health & Research World, 16*(2), 112-119.

Andrews, J. A., Tildesley, E., Hops, H., & Li, F. (2002). The influence of peers on young adult substance use. *Health Psychology, 21*(4), 349-357.

Arnett, J. J. (1998). Risk behavior and family role transitions during the twenties. *Journal of Youth & Adolescence, 27,* 301-320.

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469-480.

Arnett, J. J. (2006). *Emerging adulthood: The winding road from the late teens through the twenties.* New York, NY: Oxford University Press.

Aviles, F., Earleywine, M., Pollock, V., Stratton, J., & Miller, N. (2005). Alcohol's effect on triggered displaced aggression. *Psychology of Addictive Behaviors, 19*(1), 108-111.

Bachman, J., Wadsworth, K., O'Malley, P. M., Johnston, L., & Schulenberg, J. (1997). *Smoking, drinking and drug use in young adulthood: The impacts of new freedoms and new responsibilities.* Mahwah, NJ: Erlbaum.

Baer, J. S. (2002). Student factors: Understanding individual variation in college drinking. *Journal of Studies on Alcohol, Supplement, 14,* 40-90.

Bechara, A., Dolan, S., Denburg, N., Hindes., A., Anderson, S. W., & Nathan, P. E. (2001). Decision-making deficits, linked to a dysfunctional ventromedial prefrontal cortex, revealed in alcohol and stimulant abusers. *Neuropsychologia, 39*(4), 376-389.

Beck, K. H., Thombs, D. L., Mahoney, C. A., & Finger, K. M. (1995). Social context and sensation seeking: Gender differences in college student drinking motivations. *The International Journal of the Addictions, 30*, 1101-1115.

Beckham, J. C., Moore, S. D., Feldman, M. E., Hertzberg, M. A., Kirby, A. C., & Fairbank, J. A. (1998). Health status, somatization, and severity of posttraumatic stress disorder in Vietnam combat veterans with posttraumatic stress disorder. *American Journal of Psychiatry, 155*, 1565-1569.

Bennette, M. E., McCrady, B. S., Johnson, V., & Pandina, R. J. (1999). Problem drinking from young adulthood to adulthood: Patterns, predictors and outcomes. *Journal of Studies on Alcohol, 60*(5), 605-614.

Benton, S. L., Benton, S. A., & Downey, R. G. (2006). College student drinking, attitudes toward risks, and drinking consequences. *Journal of Studies on Alcohol, 67*(4), *543-51.*

Berg, C. A., Meegan, S. P., & Deviney, F. P. (1998). A social-contextual model of coping with everyday problems across the lifespan. *International Journal of Behavioral Development, 22*(2), 239-261.

Bernard, H. R. (2000). *Social research methods: Qualitative and quantitative approaches.* Thousand Oaks, CA: Sage.

Billings, A. G., Cronkite, R. C., & Moos, R. H. (1983). Social-environmental factors in unipolar depression: comparisons of depressed patients and nondepressed controls. *Journal of Abnormal Psychology, 92*(2), 119-133.

Borsari, B., & Carey, K. B. (2001). Peer influences on college drinking: A review of research. *Journal of Substance Abuse*, *13*, 391-424.

Brady, K. T., & Sonne, S. C. (1999). The role of stress in alcohol use, alcoholism treatment, and relapse. *Alcohol Research & Health, 23*(4), 263-271.

Bray, R. M., Bae, K. H., Federman, E. B., & Wheeless, S. C. (2005). Regional differences in alcohol use among U.S. military personnel. *Journal of Studies of Alcohol, 66*(2), 229-238.

Bray, R. M., Fairbank, J. A., & Marsden, M. E. (1999). Stress and substance use among military women and men. *American Journal of Drug Alcohol Abuse, 25*(2), 239-56.

Bray, R. M., Hourani, L. L., Rae, K. L., Denver, J. A., Brown, J. M., Vincus, A. A., & et al. (October, 2003). *2002 Department of Defense Survey of Health Related Behaviors among Military Personnel.* Research Triangle Park, NC: Research Triangle Institute.

Bray, R. M., Marsden, M. E., & Peterson, M. R. (1991). Standardized comparisons of the use of alcohol, drugs, and cigarettes among military personnel and civilians. American *Journal of Public Health, 81*(7), 865-869.

Brown, S. A. (1985). Expectancies versus background in the prediction of college drinking patterns. *Journal of Consulting and Clinical Psychology, 53*(1), 123-130.

Brown, S. A., Vik, P.W., Patterson, T. L., Grant, I., & Schuckit, M. A. (1995). Stress, vulnerability and adult alcohol relapse. *Journal of Studies on Alcohol, 56*(5), 538-545.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp.136-162). Beverly Hills, CA: Sage.

Bullers, S., Copper, M. L., & Russell, M. (2001). Social network drinking and adult alcohol involvement: A longitudinal exploration of the direction of influence. *Addictive Behaviors, 26,* 181–199.

Caetano, R., & Kaskutas, L. A. (1995). Changes in drinking patterns among Whites, Blacks, and Hispanics, 1984–1992. *Journal of Studies on Alcohol, 56,* 558–565.

Capone, C., & Wood, M. D. (2008). Density of familial alcoholism and its effects on alcohol use and problems in college students. *Alcoholism: Clinical and Experimental Research, 32*(8), 1451-1458.

Carter, C. S. (1997). Ladies don't: A historical perspective on attitudes toward alcoholic women. *Affilia, 12*, 471-478.

Center for Disease Control, (January, 2005). Alcohol fact sheet: General alcohol information. Retrieved on March 29, 2005 from http://www.cdc.gov/alcohol/factsheets/general_information.htm

Center for Disease Control, (June, 2006). Quick Stats: General Information on Alcohol Use and Health. Retrieved on September 1, 2007 from http://www.cdc.gov/alcohol/quickstats/general_info.htm

Chapman, L. J., & Chapman, J. P. (1985). Psychosis proneness. In M. Alpert (Ed.), *Controversies in Schizophrenia: Changes and consistencies.* New York: Guildford.

Chapman, L. J., Chapman, J. P., Numbers, J. S., Edell, W. S., Carpenter, B. N., & Beckfield, D. (1984). Impulsive nonconformity as a trait contributing to the prediction of psychotic-like and schizotypal symptoms. *The Journal of Nervous and Mental Disease, 172*, 681-691.

Cobb, S. (1976). Social support as a moderator of life stress. *Psychosomatic Medicine, 38*, 300-314.

Conger, J. J. (1956). Reinforcement theory and the dynamics of alcoholism. *Journal of Studies on Alcohol, 17*, 296-305.

Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment, 6*, 117-128.

Cooper, M. L., Russell, M., & George, W. H. (1988). Coping, expectancies, and alcohol abuse: test of social learning formulations. *Journal of Abnormal Psychology, 97*, 218-230.

Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology, 69*(5), 990-1005.

Cooper, M. L., Russell, M., Skinner, J. B., Frone, M. R., & Mudar, P. (1992). Stress and alcohol use: Moderating effects of gender, coping, and alcohol expectancies. *Journal of Abnormal Psychology, 101*(1), 139-152.

Covington, S. (2002). Helping women recover: Creating gender responsive treatment. In L. Straussner and S. Brown (Eds.), *The Handbook of addiction treatment for women: Theory and practice.* San Fransisco, CA: Jossey-Bass.

Crum, R. M., Muntaner, C., Eaton, W.W., & Anthony, J. C. (1995). Occupational stress and the risk of alcohol abuse and dependence. *Alcoholism: Clinical and Experimental Research, 19*, 647-655.

Davis, D. R., & DiNitto, D. M. (2005). Gender and drugs: Fact, fiction, and unanswered questions In C. A. McNeece & D. M. DiNitto, *Chemical Dependency: A Systems Approach* (3rd ed., pp. 503-545). Allyn and Bacon.

Dawson, D. A. (2000). The link betwen family history and early onset alcoholism: Earlier initiation of drinking or more parid development of dependence? *Journal of Studies on Alcohol, 61*, 637-646.

DiNitto, D. M., Webb, D. K., & Rubin, A. (2002). Gender differences in dually-diagnosed clients receiving chemical dependency treatment. *Journal of Psychoactive Drugs, 34*(1), 105-117.

Driskell, J. E., & Salas, E. (1996). *Stress and human performance.* Mahwah, NJ: Lawrence Erladaum Associates Publishers.

Dhuse, S. R. (2005). *Consequences of binge drinking: Risk and protective factors.* Doctoral dissertation, The University of Iowa.

Erikson, E. (1980). *Identity and life cycle.* New York: Norton.

Farber, P. D., Khavari, K. A., & Douglas, F. M. (1980). A factor-analytic study of reasons for drinking: Empirical validation of positive and negative reinforcement dimensions. *Journal of Consulting and Clinical Psychology, 48*, 780–781.

Federman, E. B., Bray, R. M., & Kroutil, L. A. (2000). Relationships between substance use and recent deployments among women and men in the military. *Military Psychology, 12*(3), 205-220.

Fenell, D. L., & Fenell, R. A. (2003). Counseling services for military personnel and their families. *Counseling and Human Development, 35*(9), 1-20.

Fletcher, T. D. (2006, August). *Methods and approaches to assessing distal mediation*. Paper presented at the 66th annual meeting of the Academy of Management, Atlanta, GA.

Folkman, S., & Lazarus, R. S. (1985). If it changes it must be a process: study of emotion and coping during three stages of a college examination. *Journal of Personality and Social Psychology, 48*, 150-170.

Folkman, S., Lazarus, R. S., Dunkel-Schetter, C., DeLongis, A., & Gruen, R. J. (1986). Dynamics of a stressful encounter: Cognitive appraisal, coping, and encounter outcomes. *Journal of Personality and Social Psychology, 50*, 992-1003.

Foster, J. H., Marshall, E. J., & Peters, T. J. (1998). Predictors of relapse to heavy drinking in alcohol dependent subjects following alcohol detoxification-the role of quality of life measures, ethnicity, social class, cigarette and drug use. *Addiction Biology, 3*(3), 333-343.

Frone, M. R. (1999). Work stress and alcohol use. *Alcohol Research & Health, 23*(4), 284-291.

Goldberg, J. H., Halpern-Felsher, B. L., & Millstein, S. G. (2002). Beyond invulnerability: The importance of benefits in adolescents' decision to drink alcohol. *Health Psychology*, *21*(5), 477–484.

Gotham, H. J., Sher, F. J., & Wood, P. K. (2003). Alcohol involvement and developmental task completion among young adults. *Journal of Studies on Alcohol, 64*(1), 32-42.

Green, L. W., & Kreuter, M. W. (1999) (3rd Ed.). *Health promotion planning: An educational and ecological approach.* Mountain View, CA: Mayfield.

Grucza, R. A., Cloninger, C. R., Bucholz, K. K., Constantino, J. N., Schuckit, M. A., Dick, D. M., & et al. (2006). Novelty seeking as a moderator of familial risk for alcohol dependence. *Alcoholism: Clinical and Experimental Research, 30*(7), 1176-1183.

Gruenewald, P. J., & Millar, A. B. (1993). Alcohol availability and the ecology of drinking behavior. *Alcohol, Health, and Research World, 17*(1), 39-46.

Ham, L. S., & Hope, D. A. (2003). College students and problematic drinking: A review of the literature. *Clinical Psychology Review, 23*, 719–759.

Harris, M. M., & Fennell, M. L. (1988). A multivariate model of job stress and alcohol consumption. *Sociological Quarterly, 29*(3), 391-406.

Heaney, C. A., Price, R. H., & Rafferty, J. (1995). Increasing coping resources at work: A field experiment to increase social support, improve work team functioning, and enhance employee mental health. *Journal of Organizational Behavior, 16*(4), 335-352.

Hoge, C. W., Terhakopian, A., Castro, C. A., Messer, S. C., & Engel, C. C. (2007). Association of posttraumatic stress disorder with somatic symptoms, health care visits, and absenteeism among Iraq war veterans. *American Journal of Psychiatry, 164*, 150-153.

Holcomb, J. F. (1981/1982). Alcohol and the armed forces. *Alcohol Health and Research World,* 2-17.

Hollingshead, A. B. (1946). Adjustment to military life. *The American Journal of Sociology, 51*(5), 439-447.

Hoyle, R. (1995). *Structural equation modeling: Concepts, issues and applications.* Thousand Oaks, CA: Sage Publications.

Houghton, E., & Roche, A. M. (Eds.) (2001). *Learning about drinking*. Lillington, NC: Taylor & Francis.

Ikin, J. F., McKenzie, D. P., Creamer, M. C., McFarlane, A. C., Kelsall, H. L., Glass, D. C., & et al. (2005). War zone stress without direct combat: The Australian naval experience of the Gulf war. *Journal of Traumatic Stress, 18*(3), 193-204.

Jackson, K. M., Sher, K. J., Gotham, H. J., & Wood, P. K. (2001) Transitioning into and out of large-effect drinking in young adulthood. *Journal of Abnormal Psychology, 110,* 378-391.

Jentsch, J. D., & Taylor, J. R. (1999). Impulsivity resulting from frontostraital dysfunction in drug abuse: Implications for the control of behavior by reward-related stimuli. *Psychopharmacology, 146*(4), 373–90.

Jessor, R., Donovan, J. E., & Costa, F. M. (1994). *Beyond adolescence: Problem behavior and young adult development.* New York: Cambridge University Press.

Johnsen, B.H., Laberg, J.C., & Eid, J. (1998). Coping strategies and mental health problems in a military unit. *Military Medicine*, *163*, 599-602.

Jackson, K. M., Sher, K. J., & Park, A. (2005). Drinking among college students: Consumption and consequences. In: Galanter, M., ed., *Recent Developments in Alcoholism, Vol. 17: Alcohol Problems in Adolescents and Young Adults.* New York: Springer.

Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2004). *Monitoring the Future: National Survey Results on Drug Use, 1975–2003. vol. II: College Students and Adult Ages 19-45.* NIH Pub. No. 04– 45508. Bethesda, MD: National Institute on Drug Abuse.

Joreskog, K. G. (1993). Testing structural equation models. In K. A. Bollen & J. S. Lang. (Eds.), *Testing structural equation models* (pp.294-316). Newbury Park, CA: Sage Publications.

Kaprio, J., Koskenvuo, M., Langinvainio, H., Romanov, K., Sarna, S., & Rose, R. J. (2006). Genetic Influences on Use and Abuse of Alcohol: A Study of 5638 Adult Finnish Twin Brothers. *Alcoholism: Clinical and Experimental Research, 11*(4), 349-356.

Killgore, W. D. S., Cotting, D. I., Thomas, J. L., Cox, A. L., McGurk, D., Vo, A. H., & et al. (2008, March 4). Post-combat invincibility: Violent combat experiences are associated with increased risk-taking propensity following deployment. Journal of Psychiatric Research. Retrieved June 20, 2008, from http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T8T-4S0289F-2&_user=108429&_coverDate=03%2F04%2F2008&_alid=772481287&_rdoc=1&_fmt=high&_orig=search&_cdi=5095&_sort=d&_docanchor=&view=c&_ct=1&_acct=C000059713&_version=1&_urlVersion=0&_userid=108429&md5=6e9b670841e84222e11137d9cbfb6359

Killgore, W. D. S., Stetz, M. C., Castro, C. A., & Hoge, C. W. (2006). The effects of prior combat experience on the expression of somatic and affective symptoms in deploying soldiers. *Journal of Psychosomatic Research, 60*, 379-385.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd Eds.). New York: The Guilford Press, Inc.

Lazarus, R. S. (1993). Coping theory and research: Past, present, and future. *Psychosomatic Medicine, 55*, 234-247.

Lazarus, R. S. (1999). *Stress and emotion: A new synthesis*. New York: Springer.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.

Lee, R. T., & Ashforth, B. E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *Journal of Applied Psychology, 81*, 123-133.

Leigh, B. C. (1999). Peril, chance, adventure: Concepts of risk, alcohol use and risky behaviors in young adults. *Addiction, 94*, 371-383.

Little, H. J. (2000). Behavioral mechanisms underlying the link between smoking and drinking. *Alcohol Research & Health, 24*(4), 215-224.

Liu, I., Blacker, D. L., Xu, R., Fitzmaurice, G., Tsuang, M. T., & Lyons, M. J. (2004). Genetic and environmental contributions to age of onset of alcohol dependence symptoms in male twins. *Addiction, 99*(11), 1403-1409.

Loehlin, J. C. (2004). (4th Ed.). *Latent variable models: An introduction to factor, path, and structural equation analysis.* Hillsdale, NJ: Lawrence Erlbaum Publishers.

Lovallo, W. R., Yechiam, E., Sorocco, K. H., Vincent, A. S., & Collins, F. L. (2006). Working memory and decision-making biases in young adults with a family history of alcoholism: Studies from the Oklahoma Family Health Patterns project. *Alcoholism: Clinical and experimental Research, 30*(5), 763-773.

Matzger, H., Delucchi, K., Weisner, C., & Ammon, L. (2004). Does marital status predict long-term drinking? Five-year observations of dependent and problem drinkers. *Journal of Studies on Alcohol, 65*(2), 255-265.

McCarty, D., & Kaye, M. (1983). Reasons for drinking: Motivational patterns and alcohol use among college students. *Addictive Behaviors, 9,* 185–188.

McEwan, B.S., & Sapolsky, R. M. (1995). Stress and Cognitive function. *Current Opinion on Neurobiology, 5*(2), 205-216.

McNeece, C. A., & DiNitto, D. M. (2005). *Chemical dependency: A systems approach* (3rd Ed.). Boston, MA: Pearson/Allyn and Bacon.

Military Demographics. (September, 2005). Reporting additional service demographics could enhance congressional oversight. Retrieved on November 20, 2005 from http://www.gao.gov/new.items/d05952.pdf

Moeller, F. G., Barratt, E. S., Dougherty, D. M., Schmitz, J. M., & Swann, A. C. (2001). Psychiatric aspects of impulsivity. *The American Journal of Psychiatry, 158*(11), 1783-1793.

Mooney, D. K., Fromme, K., Kivlahan, D., & Marlatt, G. (1987). Correlates of alcohol consumption: Sex, age, and expectancies relate differentially to quantity and frequency. *Addictive Behaviors, 12,* 235-240.

Mulligan, M. K., Ponomarev, I., Hitzemann, R. J., Belknap, J. K., Tabakoff, B., Harris, R. A., & et al. (2006). Toward understanding the genetics of alcohol drinking through transcriptome meta-analysis. *Proceedings of the National Academy of Sciences of the United States of America, 103*(16), 6368-6373.

Neff, J. (1997). Solitary drinking, social isolation, and escape drinking motives as predictors of high quantity drinking, among Anglo, African American and Mexican American males. *Alcohol and Alcoholism, 32*(1), 33-41.

Nelson-Zlupko, L., Kauffman, E., & Dore, M. M. (1995). Gender differences in drug addiction and treatment: Implications for social work intervention with substance-abusing women. *Social Work, 40*(1), 45-54.

Newman, B. M., & Newman, P. R. (2005). *Development through life: A psychological approach* (8th Ed.). Pacific Grove: Brooks/Cole.

Noy, S. (1991). Combat stress reactions. In R. Gal & A. D. Mangelsdorff (Eds.), *Handbook of military psychology* (pp. 507–530). Chichester, England: Wiley.

O'Hare, T. M. (1990). Alcohol expectancies and social anxiety in male and female undergraduates. *Addictive Behaviors, 15*, 561–566.

O'Malley, P. M. (2005) Maturing out of problematic alcohol use. *Alcohol Research & Health, 28*(4), 202-204.

O'Malley, P. M., Bachman, G. M., & Johnston, L. D. (1984). Period, age, cohort effects on substance use among American youth. *American Journal of Public Health, 74* (7), 682-688.

O'Malley, P. M., & Johnston, L. D. (2002). Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol, (Suppl. 14*), 23-39.

Orasanu, J. M., & Baker, P. (1996). Stress and military performance. In J.E. Driskell & E. Salas (Eds.), *Stress and human performance* (pp. 89-125). Mahwah, NJ: Lawrence Erlbaum Associates.

Pandina, R. J., Labouvie, E. W., & White, H. R. (1984). Potential contributions of the life span developmental approach to the study of adolescent alcohol and drug use: The Rutgers health and human development project, a working model. *Journal of Drug Issues, 14,* 253-268.

Park, C. L., Armeli, S., & Tennen, H. (2004). The daily stress and coping process and alcohol use among college students. *Journal of Studies on Alcohol, 65*(1), 126-135.

Pearlin, L. I., Lieberman, M. A., Menaghan, E. G., & Mullan, J. T. (1981). The stress process. *Journal of Health and Social Behavior, 22*, 337-356.

Perkins, H. W. (2002). Social norms and the prevention of alcohol misuse in collegiate contexts. *Journal of Studies on Alcohol, (Suppl. 14)*, 164-172.

Polich, J. M. (1979). Alcohol problems among civilian youth and military personnel. In Blane, HT, Charetz, ME (Eds.), *Youth, Alcohol, and Social Policy.* New York, NY: Plenum Press.

Presley, C. A., Meilman, P. W., & Leichliter, J. S. (2002). College factors that influence drinking. *Journal of Studies on Alcohol, 63(Suppl 14)*, 82–90.

Read, J. P., Wood, M. D., Kahler, C. W., Maddock, J. E. (2003). Examining the role of drinking motives in college student alcohol use and problems. *Psychology of Addictive Behaviors, 17*(1), 13-23.

Rice, P. L. (1999). *Stress and health*. Pacific Grove, CA: Brooks/Cole Publishing Co.

Rivaux, S. L., Sohn, S., Armour, M., & Bell, H. (In press, 2008). Women's recovery: Managing the dilemma of substance abuse and intimate partner relationships. *Journal of Drug Issues.*

Ruzek, J. I., Brymer, M. J., Jacobs, A. K., Layne, C. M., Vernberg, E. M., & Watson, P. J. (2007). Psychological first aid. *Journal of Mental Health Counseling, 29*(1), 17-33.

Saton, M., Leukefeld, C., Logan, T. K., Zimmerman, R., Lynam, D., Milich, R., & et al. (1999). Risky sexual behavior and substance use among young adults. *Health and Social Work, 24*(2), 147-154.

Sayette, M. A., Kirchner, T. R., Moreland, R. L., Levine, J. M., & Travis, T. (2004). Effects of alcohol on risk-seeking behavior: A group-level analysis. *Psychology of AddictiveBehaviors, 18,* 190-193.

Schuckit, M. A. (1985). The clinical implications of primary diagnostic groups among alcoholics. *Archives of General Psychiatry, 42*(11), 1043-1177.

Schuckit, M. A. (1998). Biological, psychological and environmental predictors of the alcoholism risk: a longitudinal study. *Journal of Studies on Alcohol, 59*, 485-494.

Schuckit, M. A. (2000). Genetics of the risk for alcoholism. *American Journal on Addictions, 9*, 103-112.

Schuckit, M.A., & Smith, T. L. (1996). An 8-year follow-up of 450 sons of alcoholic and control subjects. *Archives of General Psychiatry, 53*(3), 202–210.

Schuckit, M. A., & Smith, T. L. (2000). The relationships of a family history of alcohol dependence, a low level of response to alcohol, and six domains of life functioning to the development of alcohol use disorders. *Journal of Studies on Alcohol, 61*, 827–835.

Schulenberg, J. E., & Maggs, J. L. (2002). A developmental perspective on alcohol use and heavy drinking during adolescence and the transition to young adulthood. *Journal of Studies on Alcohol,* (Suppl.14), 54–70.

Schulenberg, J. E., O'Malley, P. M., Bachman, J. G., Wadsworth, K. N., & Johnston, L. D. (1996). Getting drunk and growing up: Trajectories of frequent binge drinking during the transition to young adulthood. *Journal of Studies on Alcohol*, 57(3), 289–304.

Sharkansky, E. J., King, D. W., King, L. A., Wolfe, J. Erickson, D. J., & Stokes, L. R. (2000). Coping with Gulf war combat stress: Mediating and moderating effects. *Journal of Abnormal Psychology, 109*(2), 188-197.

Sher, K. J., Walitzer, K. S., Wood, P. K., & Brent, E. E. (1991). Characteristics of children of alcoholics: putative risk factors, substance use and abuse, and psychopathology. *Journal of Abnormal Psychology, 100*, 427- 448.

Simons, J. S. (2003). Differential prediction of alcohol use and problems: The role of biopsychological and social-environmental variables. *The American Journal of Drug and Alcohol Abuse, 29*(4), 861-879.

Simons, J. S., Carey, K. B., & Gaher, R. M. (2004). Lability and impulsivity synergistically increase risk for alcohol-related problems. *The American Journal of Drug and Alcohol Abuse, 30*(3), 685-94.

Smith, G. T., Goldman, M. S., Greenbaum, P. E., & Christiansen, B. A. (1995). Expectancy for social facilitation from drinking: The divergent paths of high-expectancy and low-expectancy adolescents. *Journal of Abnormal Psychology, 104,* 32- 40.

Stevens, J. (2002). (4th Ed.). *Applied multivariate statistics for the social sciences*. Mahwah, NJ: Lawrence Erlbaum Associates.

Stewart, J. (2000). Pathways to relapse: The neurobiology of drug-and stress-induced relapse to drug-taking. *Journal of Psychiatry & Neuroscience, 25*(2), 125-136.

Stewart, S. H., & Devine, H. (2000). Relations between personality and drinking motives in young adults. *Personality and Individual Differences, 29*, 495–511.

Stone, A. A., & Neale, J. M. (1984). New measure of daily coping: development and preliminary results. *Journal of Personality and Social Psychology, 46*(4), 892-906.

Substance Abuse and Mental Health Services Administration (SAMHSA). (2004). *Results from the 2003 National Survey on Drug Use and Health: National Findings.* NSDUH Series H–25, DHHS Pub. No. SMA 04–3964. Rockville, MD: SAMHSA, Office of Applied Studies.

Substance Abuse and Mental Health Services Administration (SAMHSA). (September, 2006). Results from the 2005 National Survey on Drug Use and Health: National Findings. Rockville, MD: SAMHSA, Office of Applied Studies.

Temple, M. T., & Fillmore, K. M. (1986). The variability of drinking patterns and problems among young men, age 16-31: A longitudinal study. *International Journal of Addiction, 20*, 1595-1620.

Tennen, H., Affleck, G., Armeli, S., & Garney, M. A. (2000). A daily process approach to coping: Linking theory, research, and practice. *American Journal of Psychology, 55,* 626-636.

Tran, G. Q., Haaga, D. A. F., & Chambless, D. L. (1997). Expecting that alcohol use will reduce social anxiety moderates the relation between social anxiety and alcohol consumption. *Cognitive Therapy and Research, 21*(5), 535–553.

Valentine, P. V. (2005). The etiology of addiction. In C. A. McNeece & D. M. DiNitto, *Chemical Dependency: A Systems Approach* (3rd ed., pp. 23-35). Allyn and Bacon.

Vogel-Sprott, M., & Chipperfield, B. (1987). Family history of problem drinking among young male social drinkers: Behavioral effects of alcohol. *Journal of Studies on Alcohol, 48*(5), 430-435.

Waldeck, T. L., & Miller, L. S. (1997). Gender and impulsivity differences in licit substance use. *Journal of Substance Abuse, 9*, 269-75.

White, H. R., & Jackson, K. (2005). Social and psychological influences on emerging adult drinking behavior. *Alcohol Research & Health, 28*(4), 182-190.

White, H. R., Labouvie, E. W., & Papadaratsakis, V. (2005). Changes in substance use during the transition to adulthood: A comparison of college students and their noncollege age peers. *Journal of Drug Issues, 35*, 281–306.

Wilhelmsen, K. C., Schuckit, M., Smith, T. L., Lee, J. V., Segall, S. K., Feiler, H. S., & et al. (2003). The search for genes related to a low-level response to alcohol determined by alcohol challenges. *Alcoholism: Clinical & Experimental Research*, *27*(8), 1041- 1048

Wood, M. D., Read, J. P., Palfai, T. P., & Stevenson, J. F. (2001). Social influence processes and college student drinking: The mediational role of alcohol outcome expectancies. *Journal of Studies on Alcohol, 62*(1), 32-43.

Xie, J. L., & Johns, G. (1995). Job scope and stress: Can scope be too high? *Academy of Management Journal, 38*(5), 1288-1309.

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit-formation. *Journal of Comparative Neurology and Psychology, 18*, 459-482.

Zuckerman, M. (1994). *Behavioral expressions and biological bases of sensation seeking.* Cambridge University Press.

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